Johnson Space Center

1999 Annual Report

Table of Contents

The past year was one of great achievement for the Johnson Space Center. From launching the initial elements of the International Space Station to making historic discoveries in research, it was a year of unprecedented accomplishment.

After years of planning and hard work, the International Space Station is now a reality, visible in the sky above. In the coming years, we will see this orbiting outpost grow significantly as on-orbit assembly continues.

The Space Shuttle Program concluded another year of safe and successful missions. Upgrades to the Shuttle system will ensure that the spacecraft continues its unparalleled record of safety and success.

JSC's continued emphasis on safety has reaped benefits in space and in the workplace. In May, following a 2-week on-site audit, representatives from the Occupational Safety and Health Administration recommended the Center for Voluntary Protection Program Star work site status. Earning OSHA's highest award marked the culmination of months of intensive preparation on the part of all employees.

We made strides in technology development. Our scientists and engineers achieved advances in nanotube technology, in innovative medical applications, and in spacesuit design and life-support systems development. They took the *X-38* and *TransHab* prototypes through advanced stages of development and testing.

JSC scientists found liquid water in an ancient meteorite, the first discovery of its kind and an indication that life may exist beyond our planet. The National Space Biomedical Research Institute investigators continued to develop techniques to control the human physiological problems associated with long-duration space flight.

Our White Sands Test Facility again had an outstanding year of performance, providing a wide variety of research, test, and development support to NASA centers, the Department of Defense, other government agencies, and private industry.

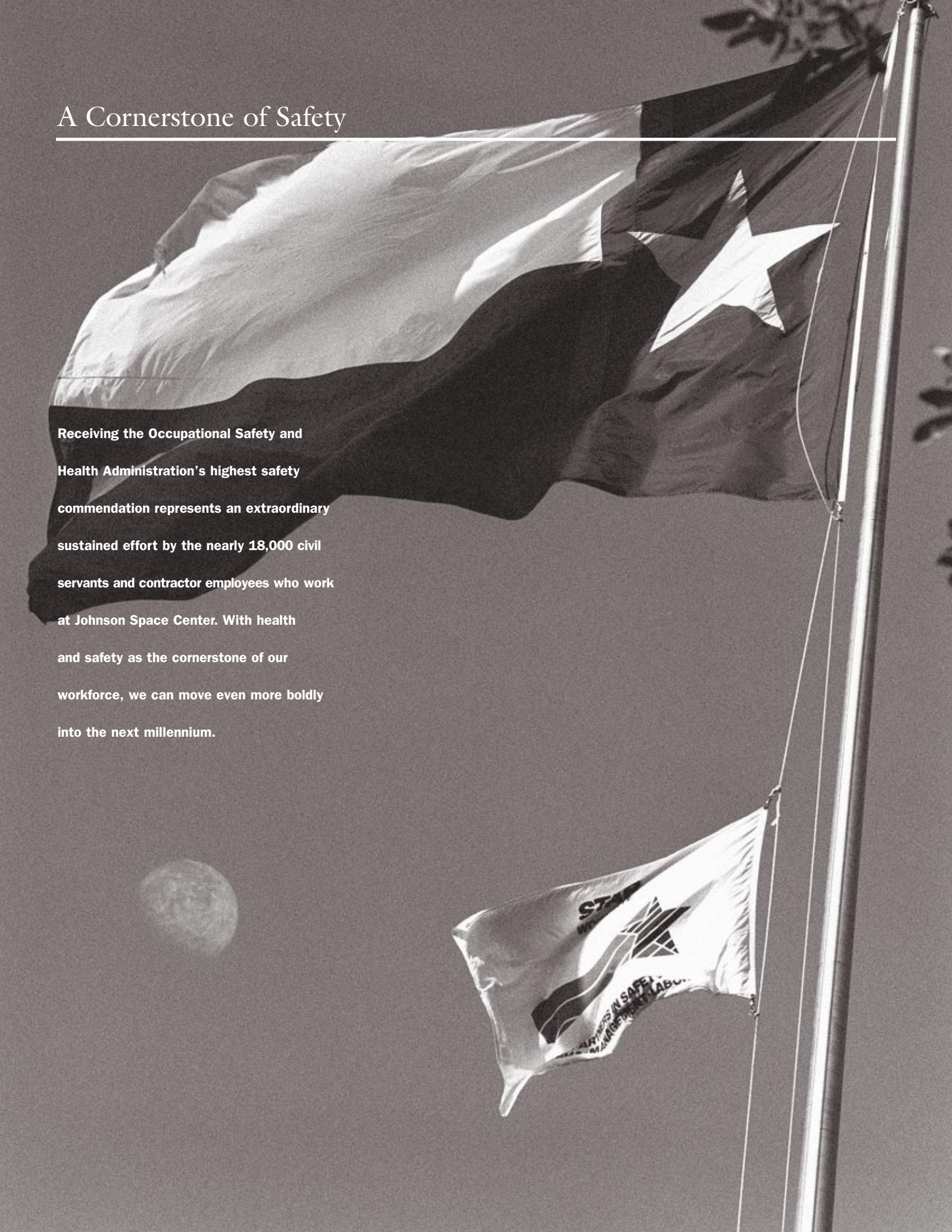
Our efforts to work with the community and to open the Center to the public were met with enthusiasm. Our Open House and NASA Johnson Space Center Inspection set attendance records.

I am proud to present the 1999 Annual Report of the Johnson Space Center. It demonstrates the hard work, devotion, extraordinary talent, and exceptional teamwork that continue to produce the important accomplishments that prepare us for the future. As we enter the new century, we will continue to improve life on Earth through the human enterprise of space exploration.

George W.S. Abbey

Johnson Space Center Director George Abbey
George Abbey congratulates Arlene Andrews, recipient of the Marilyn J. Bockting Secretarial Excellence Award.

A Cornerstone of Safety



Receiving the Occupational Safety and Health Administration's highest safety commendation represents an extraordinary sustained effort by the nearly 18,000 civil servants and contractor employees who work at Johnson Space Center. With health and safety as the cornerstone of our workforce, we can move even more boldly into the next millennium.

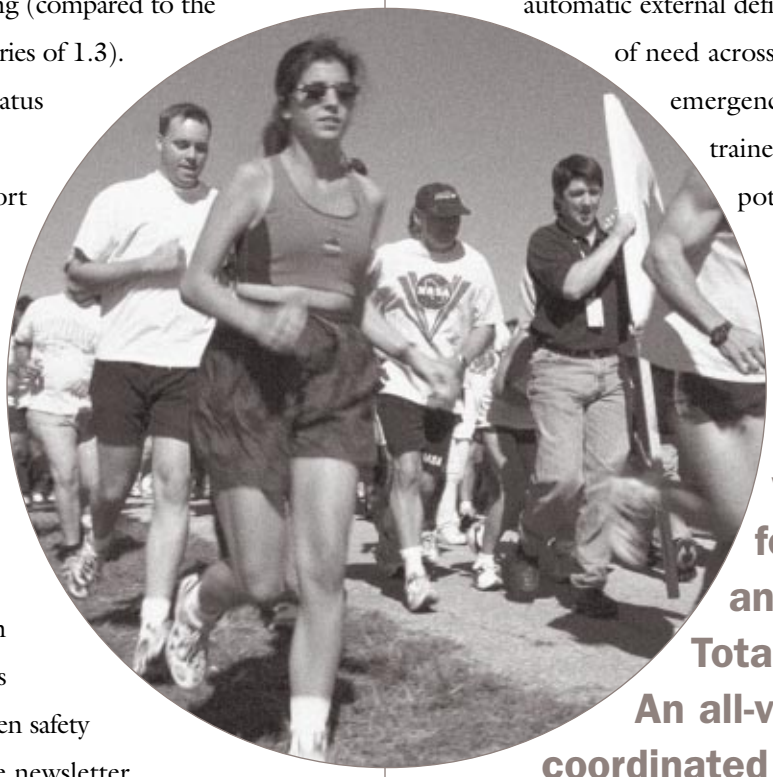
In 1999, Johnson Space Center became the first federal entity to earn both the Occupational Safety and Health Administration's Voluntary Protection Program (VPP) Star work site status and ISO 9001 certification.

Only 500 companies in the country have earned the VPP Star work site designation, OSHA's most prestigious award. JSC is the largest and most complex facility in OSHA's region VI, yet still manages to have an impressive record, such as the Center's 0.2 lost-workday rating (compared to the national average for like industries of 1.3).

JSC's VPP Star work site status represents the participation, dedication, and sustained effort of every civil servant and contractor employee. An Executive Safety Committee now sets safety policy for the Center, and the JSC Safety Action Team involves employees directly in making improvements to the Center's safety and health program. A Center Director's hotline, line-management-driven safety committees, and an employee newsletter devoted to safety and health issues have improved safety communication and awareness. Every employee is involved in day-to-day safety activities, including walkthroughs, close-call reporting, hazard recognition and control, and workplace inspections. The concerted effort toward creating a risk-free workplace has resulted in fewer mishaps and injuries, as well as lower operating costs and higher productivity.

JSC's annual Safety and Total Health Day, a full-day stand-down across the Center, is the most important employee-managed event. The 1999 event featured more than 60 booths, guest speakers, a health run/walk, a blood drive, CPR training, seminars, and demonstrations.

To increase awareness, prevention, and response to heart disease and heart attacks, a campaign titled "Got the Squeeze, Call the 33333s" was begun in February. As part of the effort, automatic external defibrillators were placed in areas of need across the Center to provide JSC emergency responders and specially trained personnel with additional potential life-saving capabilities.



The enthusiasm and level of participation were unparalleled for this year's annual Safety and Total Health Day. An all-volunteer team coordinated various booths, speakers, entertainment, food events, and exhibits for a record number of employees and their family members.

Safety and Total Health Day
Employees concluded JSC's Safety and Total Health Day with a health run/walk, after having spent the day collecting health-enhancing information.

A Framework for Tomorrow

In the world of human endeavor, the International Space Station breaks new ground. With its first elements put in place late in 1998, the International Space Station will afford scientists, engineers, and entrepreneurs an unprecedented platform on which to perform complex, long-duration, and replicable experiments in the unique environment of space.

The International Space Station is the largest and most complex scientific cooperative project in history. Led by the United States, it draws upon the scientific and technological resources of 16 nations. When completed, the International Space Station will have a mass of about 1 million pounds. It will measure about 360 feet across and 290 feet in length and will have an internal volume roughly equal to the passenger volume of a 747 jumbo jet. Six laboratories will provide more space for research than any other spacecraft ever built.

More than 40 space flights during 5 years and at least three launch vehicles — the Space Shuttle, the Russian Soyuz rocket, and the Russian Proton rocket — will deliver the International Space Station components to orbit. Assembly of the more than 100 components will require a combination of human spacewalks and robotic devices.

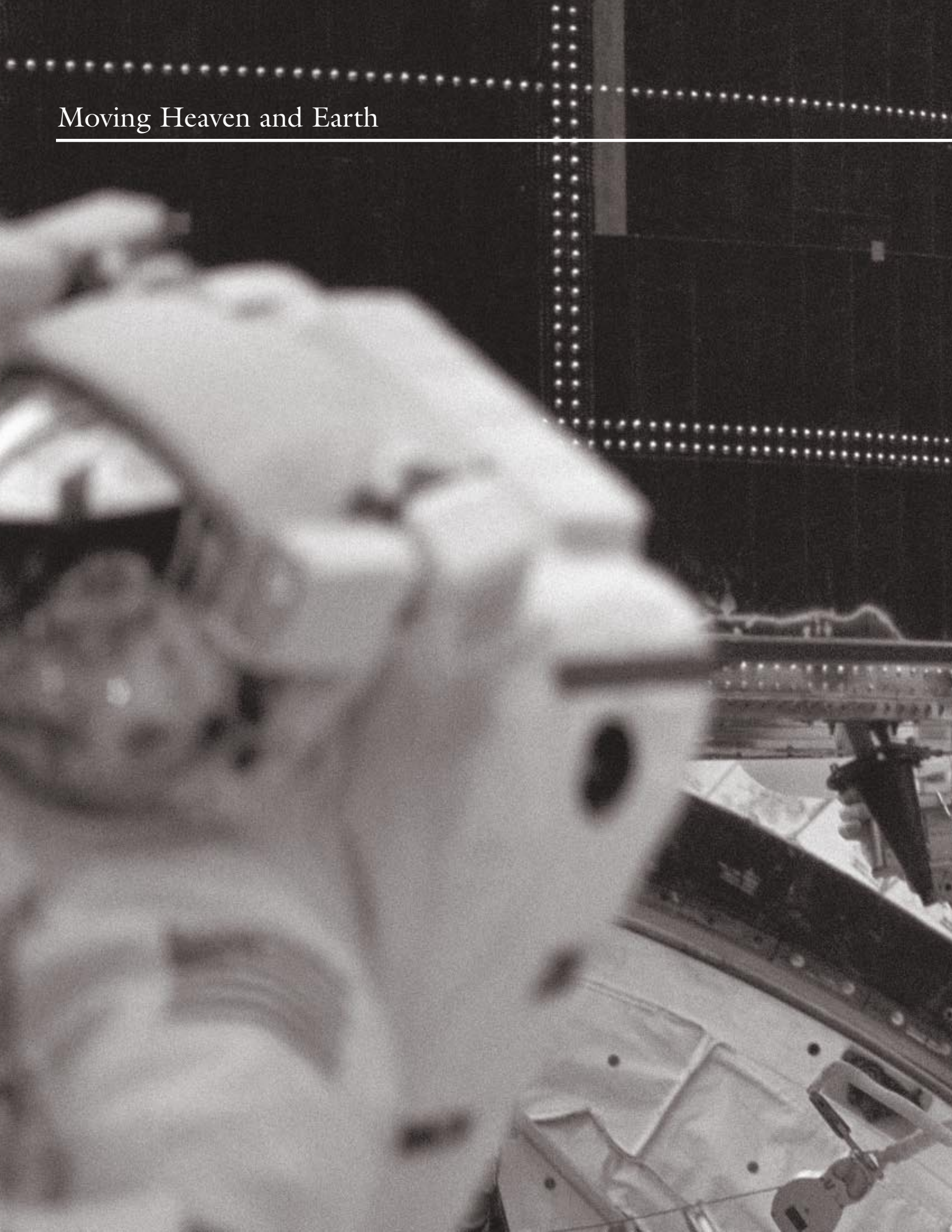
As the new century began, the first stages of construction had been completed and a 7-story, 76-foot-long, 35-ton Space Station orbited the Earth. The first component of the Station was the Control Module *Zarya,* Russian for "Sunrise," which was built in Russia under contract to the U.S. This unpiloted "space tugboat" was launched by the Russian Proton rocket in November 1998. The following month, a Shuttle crew attached the second Station component, *Unity,* to *Zarya*.

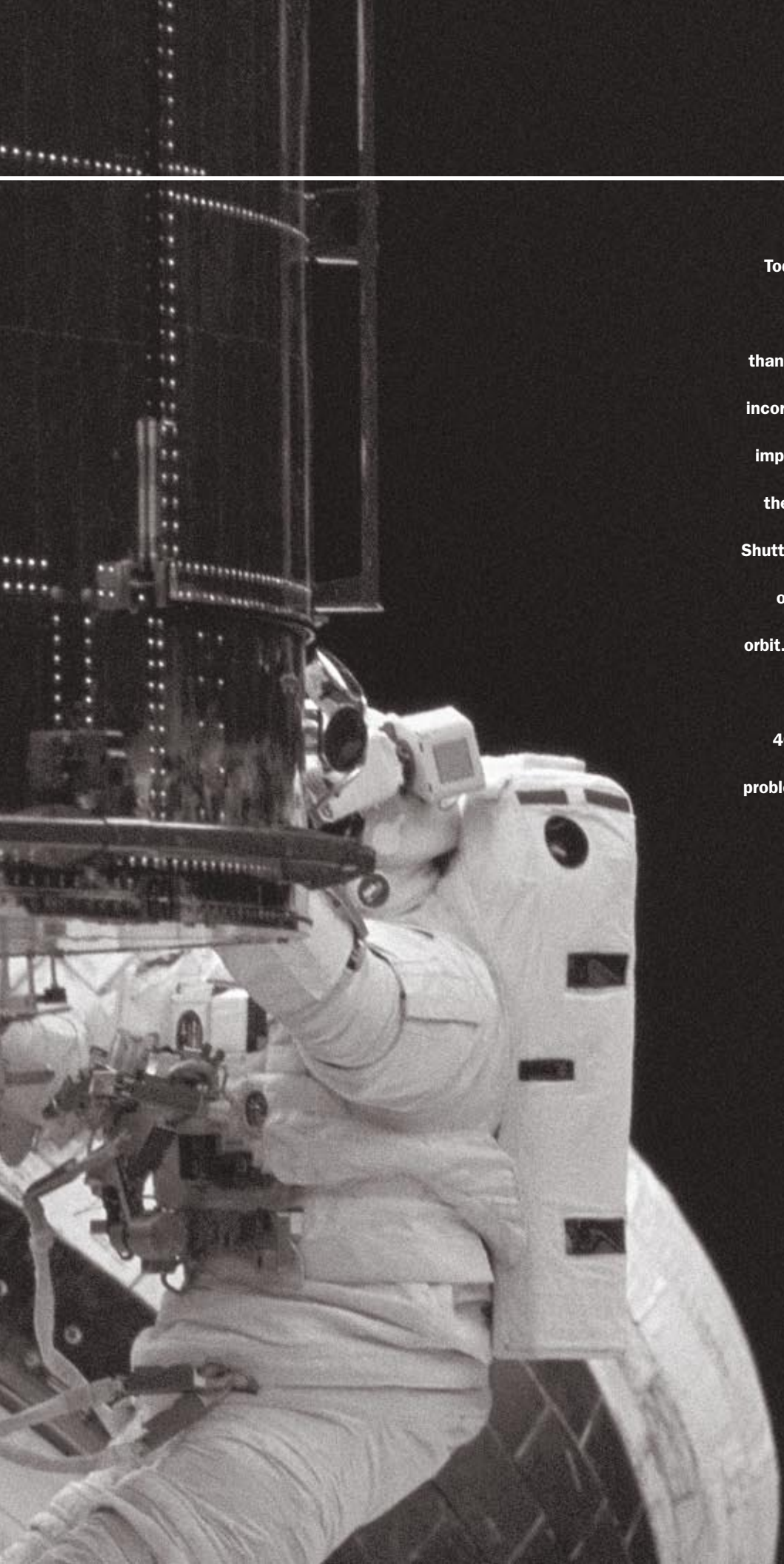
Primary oversight for all flight control, training, planning, and construction of the International Space Station is at the Johnson Space Center. Monitoring Station operations is a continuous job for Station flight controllers in the Flight Control Room in the Mission Control Center. They coordinate with JSC flight controllers in Russia and with the flight control centers of our international partners.

The Mission Evaluation Room for the International Space Station is now operating 24 hours a day, 7 days a week. Twelve managers oversee the day-to-day activities of the International Space Station mission. During assembly operations, three managers are on console around the clock and a team of 300 engineers are on call.

Mission Control
JSC is the operations center controlling on-orbit Shuttle and International Space Station missions. The Control Center's flexible configuration allows the flight control team to simultaneously command multiple spacecraft.

Moving Heaven and Earth





Today's Space Shuttle, is safer, more capable, and less expensive to fly than ever before, thanks to enhancements from new technologies incorporated into the original Shuttle design and improvements to the Shuttle's operation. Since the first flight of *Columbia* in 1981, the Space Shuttle has launched more than 2 million pounds of cargo and more than 500 passengers into orbit. As improvements to the vehicles continue, today's Shuttles are three times safer, cost 40 percent less to operate, have few in-flight problems, and have an additional 16,000 pounds of cargo capacity.

"That Shuttle is a fantastic, amazing, tremendous, reliable flying machine." Commander Eileen Collins

America's Space Shuttles undergo performance evaluations, testing, repairs, and improvements on a continuous basis, but this year included extensive upgrades. Early in the year, *Atlantis* returned to Florida after 130 modifications and improvements. The most apparent is the glass cockpit, similar to systems common in commercial airliners, which weighs less, uses less power, and has greater capabilities. All of the Space Shuttles will be upgraded with the glass cockpit, enabling future upgrades to a smart cockpit that will reduce pilot workload during normal flights and emergency situations.

The Space Shuttle remains the most advanced human spacecraft in the world. The Shuttles are the workhorses that will enable us to build and maintain the International Space Station, the foundation for future exploration beyond Earth's orbit.

Shuttle mission STS-88, launched from Kennedy Space Center on December 4, 1998, was the first of more than 35 planned Shuttle flights to assemble the Space Station. The Space Shuttle *Endeavour,* with a crew of five Americans and one Russian, carried the *Unity* module, a six-sided connector for future Station components. The crew rendezvoused with the orbiting *Zarya* module and, using the Shuttle's Canadian-built robotic arm, docked it to *Unity* on December 6, 1998. The crew finished the connections between the two spacecraft during three spacewalks. They entered the interior of *Unity* and *Zarya* to install communications equipment and complete other assembly work. The crew returned home after 12 days.

Discovery launched on May 27, 1999, and performed the first docking with the new Space Station on May 29. *Discovery*'s international crew included one Canadian, one Russian, and five Americans. The STS-96 crew delivered almost 2 tons of supplies and equipment for the Station, including clothing, laptop computers, water for the first resident station crew, and spare parts.

The crew also performed one spacewalk to install a U.S.-developed spacewalker's crane, the base of a Russian-developed crane, and other spacewalking tools on the Station's exterior for use by future Station assembly crews. *Discovery* fired its thrusters to reboost the Space Station's orbit, undocked, and then landed on June 6.

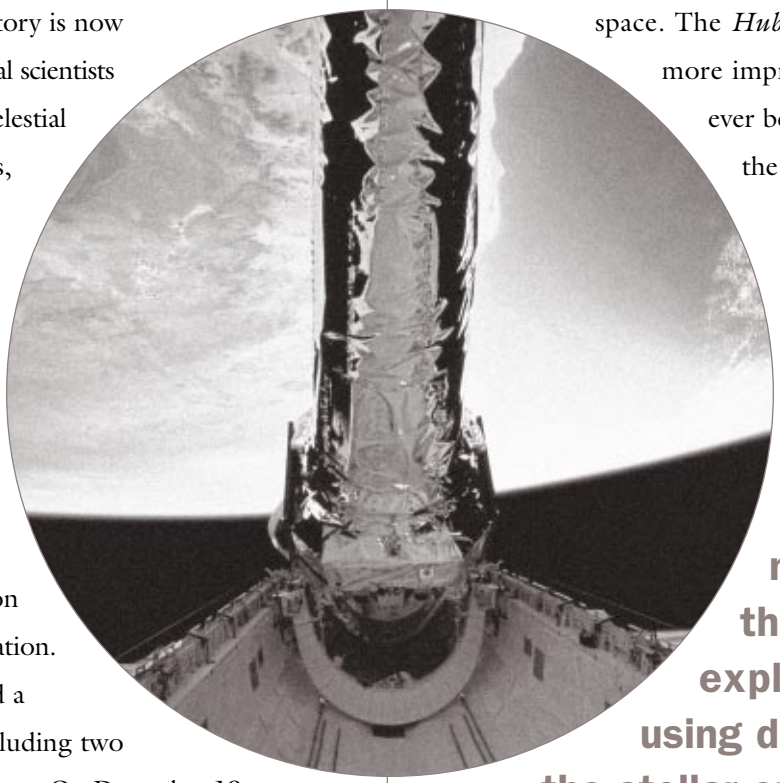
STS-93 First Female Commander
Col. Eileen Collins made news — and history — in 1999 as the first female Space Shuttle commander. Selected as an astronaut in 1990, she has logged more than 500 hours in space.

The STS-93 mission made news for several reasons: it launched NASA's third "Great Observatory," the *Chandra* X-ray Observatory; it was commanded by Eileen Collins, the first woman to command a Shuttle mission; and it carried the heaviest payload ever. This landmark mission was launched on July 22, 1999. Approximately 7 hours into the flight, the crew successfully deployed the *Chandra,* a 5-ton, 57-foot spacecraft, from *Columbia*. This advanced x-ray observatory is now enabling U.S. and international scientists to determine the nature of celestial objects, such as stars, quasars, exploding stars, and galactic collisions, and, in general, understand the history and evolution of the universe.

In December 1999, the STS-103 crew serviced the *Hubble* Space Telescope, upgrading its systems and extending its scientific mission into a second decade of operation. Commander Curt Brown led a crew of seven astronauts, including two from the European Space Agency. On December 19, 2 days into the flight, the crew reached the *Hubble* Space Telescope, which orbits at approximately 350 miles above the Earth, nearly the highest point attainable by the Shuttle. Brown flew *Discovery* in for a manual approach within 35 feet of the *Hubble* — just close enough to reach it with the robotic arm.

The crew replaced all six gyroscopes and a fine-guidance sensor and installed a much more advanced computer. They also installed a new transmitter, a solid-state recorder, and thermal insulation blankets on the "hot" side of the telescope.

After servicing and upgrading the *Hubble,* the crew put the telescope back into orbit and returned home to Florida for a safe landing after almost 8 days in space. The *Hubble* is now sending back more impressive observations than ever before to astronomers around the world.

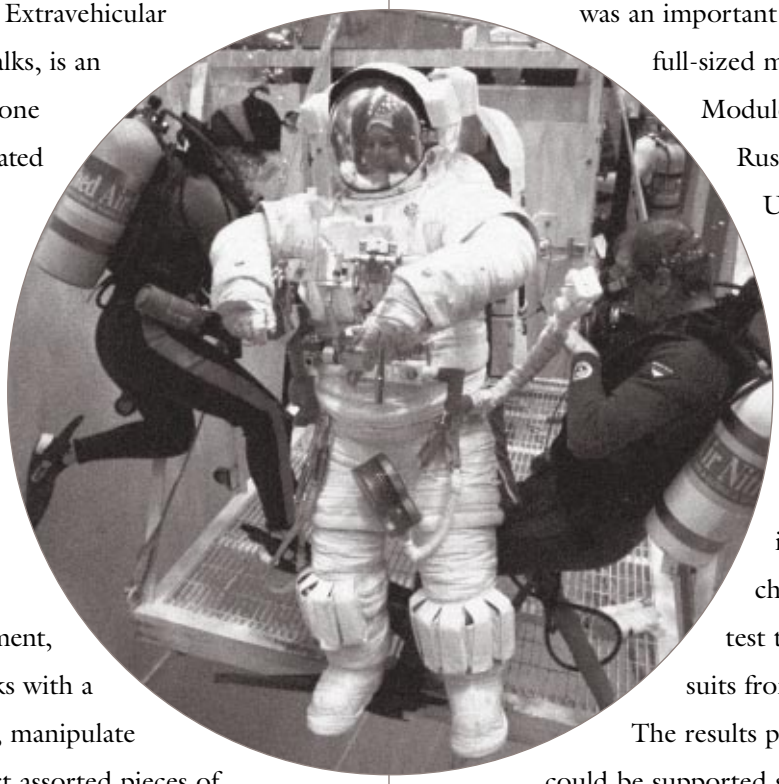


The *Chandra* X-ray Observatory is the third of NASA's "Great Observatories" now in orbit. The three observatories explore our universe using different parts of the stellar energy spectrum. *Hubble* Space Telescope detects light, *Chandra* X-ray Observatory detects x-rays, and the *Compton* Gamma Ray Observatory detects higher energy gamma rays.

***Chandra* X-ray Observatory**
The *Chandra*, the third of NASA's "Great Observatories," and the world's most powerful x-ray telescope, was deployed July 23, 1999, and continues to send us new information about the evolution of the universe.

Imagine doing construction work with an international crew, some 250 miles above the Earth, in the airless reaches of space, where conditions alternate between searing and freezing, while you're orbiting the Earth at 17,500 mph.

Astronauts made it look easy as they assembled the first components of the International Space Station, placed tools and equipment on board for use by future crews, and did the precise and delicate job of servicing the *Hubble* Space Telescope. But each of these Extravehicular Activities (EVAs), or spacewalks, is an entire mini-mission in itself, one that takes decades of accumulated knowledge and training, as well as ongoing research, development, preparation, and coordination. To perform spacewalks, the astronauts have to function within their own private "spaceships" — Extravehicular Maneuvering Units. In this unique environment, they have to do complex tasks with a variety of sophisticated tools, manipulate large equipment, and connect assorted pieces of space hardware.



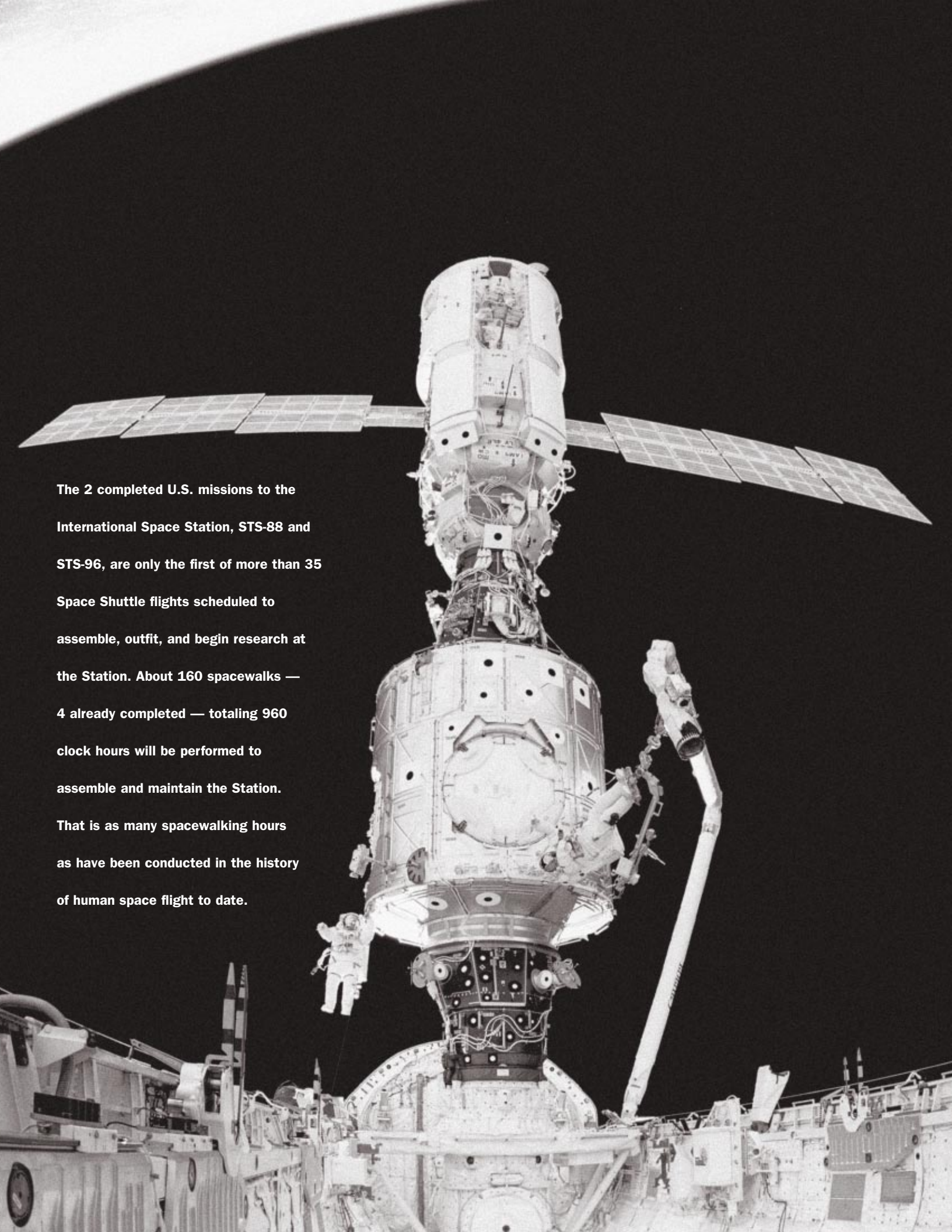
The EVA Project Office is NASA's focal point for spacewalks. EVA activities include those from the Space Shuttle, the Space Station, and other human-tended spacecraft, and perhaps for lunar and Mars surface operations.

Much of the training for U.S. and international spacewalkers takes place in the award-winning Neutral Buoyancy Lab at the Sonny Carter Training Facility. Training also takes place in the Russian equivalent, the Hydrolab, located at the Gagarin Cosmonaut Training Center in Star City.

This year, two important events took place that will allow us to expand our astronaut training capabilities in this area. After 2 years of cooperation, two U.S. spacesuits were successfully tested underwater at the Hydrolab, opening the door to additional U.S. crew training in Russia. This was an important development because a full-sized model of the ISS Service Module is now available only in Russia at the Hydrolab. Also, a U.S. spacesuit and a Russian Orlan spacesuit were tested together in the Space Station Airlock Test Article at JSC. It was the first time that a Russian spacesuit had been tested in an American vacuum chamber, and it was the first test that combined astronauts in suits from two different countries. The results proved that the two suits could be supported simultaneously by hardware components designed for the new Space Station's airlock.

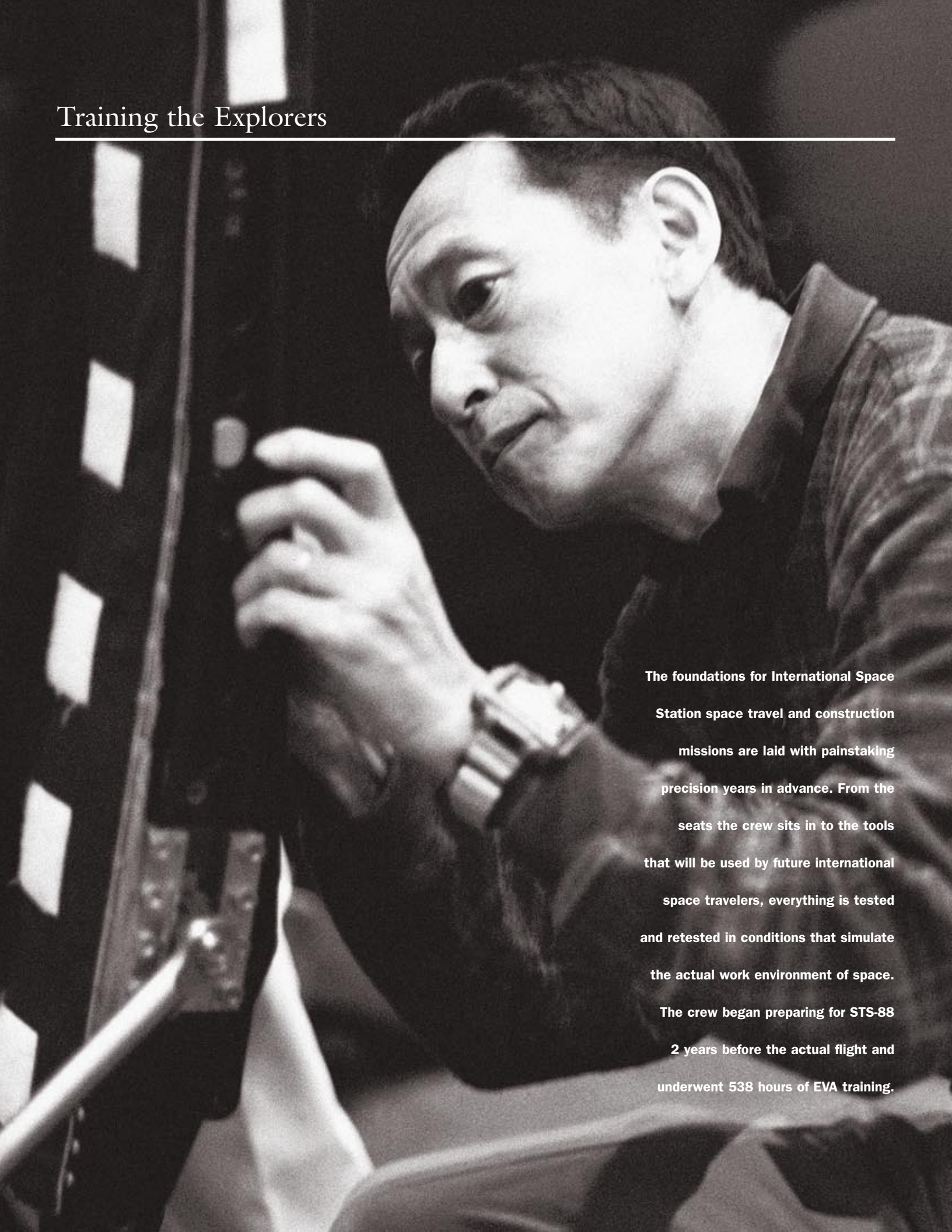
JSC's Advanced Technology Spacesuit Project team is evaluating prototypes for the next generation of spacesuits. The new suits and life-support systems promise to be lighter, more mobile, and capable of being maintained and serviced in space by astronauts themselves.

Spacesuit Test Team
There's no such thing as being over prepared for a spacewalk. Many hours are spent in JSC's Neutral Buoyancy Lab training with such elements as the Extravehicular Maneuvering Unit.



The 2 completed U.S. missions to the International Space Station, STS-88 and STS-96, are only the first of more than 35 Space Shuttle flights scheduled to assemble, outfit, and begin research at the Station. About 160 spacewalks — 4 already completed — totaling 960 clock hours will be performed to assemble and maintain the Station. That is as many spacewalking hours as have been conducted in the history of human space flight to date.

Training the Explorers



The foundations for International Space Station space travel and construction missions are laid with painstaking precision years in advance. From the seats the crew sits in to the tools that will be used by future international space travelers, everything is tested and retested in conditions that simulate the actual work environment of space. The crew began preparing for STS-88 2 years before the actual flight and underwent 538 hours of EVA training.

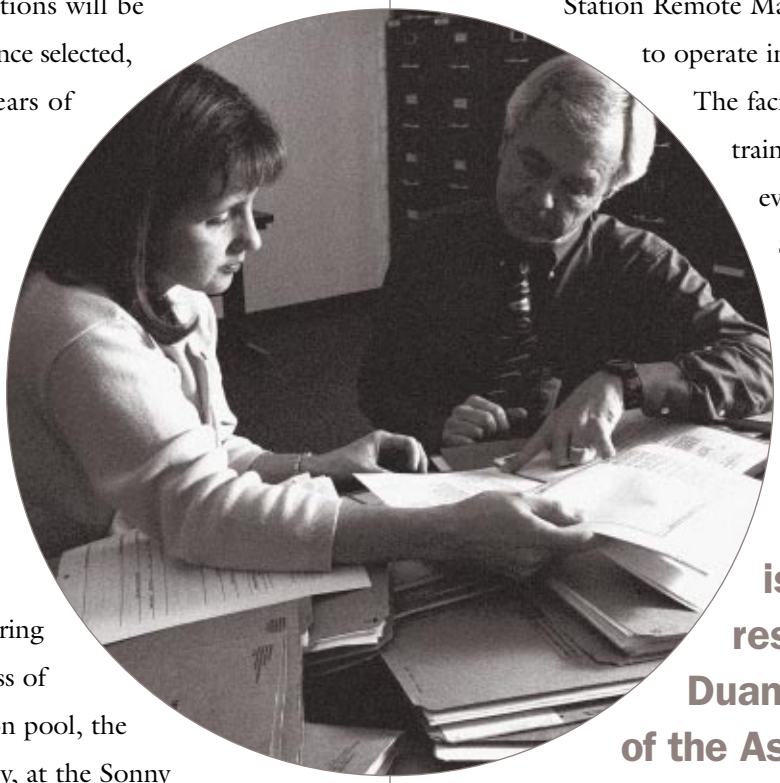
Johnson Space Center is responsible for recruiting and training U.S. astronauts and ultimately assigning them to missions. It is here that some of the most exceptional men and women in the world prepare for their most extraordinary work.

Every 2 years, the selection process begins for another astronaut candidate class. In 1999, more than 3,000 applications were received. The screening process is in progress, and the final selections will be announced in spring 2000. Once selected, astronauts receive several years of training for future missions aboard the Shuttle and the International Space Station. Preparation at JSC is so thorough that the astronauts say only the vibrations from launch and the experience of weightlessness are missing from the practice sessions.

A crucial element for preparing for work in the weightlessness of space is the 6.2-million-gallon pool, the Neutral Buoyancy Laboratory, at the Sonny Carter Training Facility. The pool and the techniques developed to simulate zero g are essential tools for spacewalk training and for the design, development, and testing of the Space Station and future NASA spacecraft.

Training is also conducted in Space Shuttle fixed-base and motion-base simulators at JSC. To maintain flying proficiency, astronauts train in T-38 jets and in the Shuttle Training Aircraft, a modified Gulfstream jet designed to mimic the landing characteristics of the Space Shuttle. These aircraft are housed at Ellington Field.

With the completion of the massive Multi-use Remote Manipulator Development Facility in Building 9 in 1999, JSC has acquired an important new addition to its array of astronaut training tools. The 15-ton, 60-foot-long robotic arm is a full-scale replica of the Canadian-built Space Station Remote Manipulator System, designed to operate in a gravity environment. The facility provides preflight training for astronauts who will eventually operate the actual Station arm on orbit to assemble the Space Station.

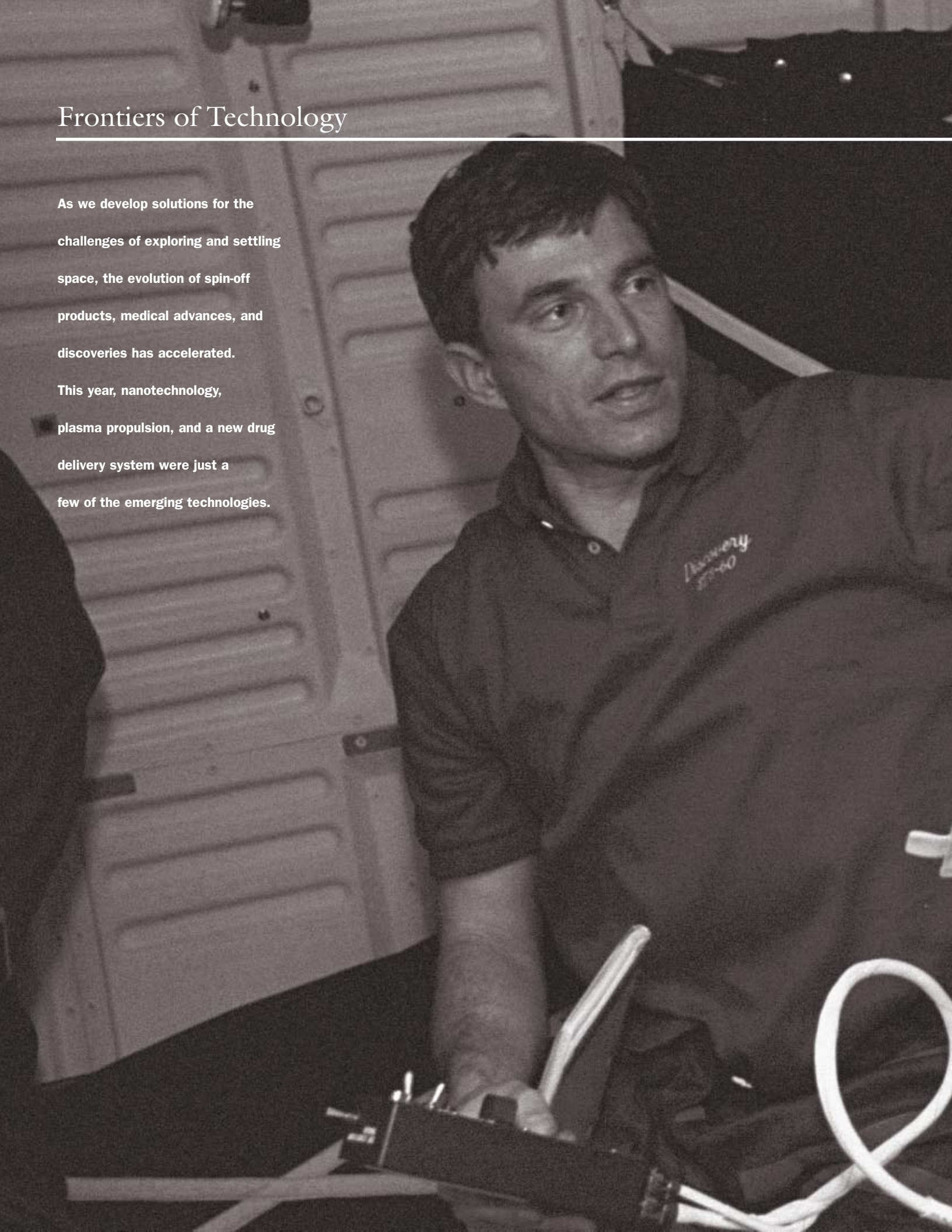


Selecting America's future astronauts is an awesome responsibility, but Duane Ross, manager of the Astronaut Selection Office, and Teresa Gomez, assistant manager, make processing the paperwork — more than 3,000 applications — look easy.

Teresa Gomez and Duane Ross
Since 1984, Teresa Gomez and Duane Ross have done an exemplary job of processing all paperwork involved in astronaut selection.

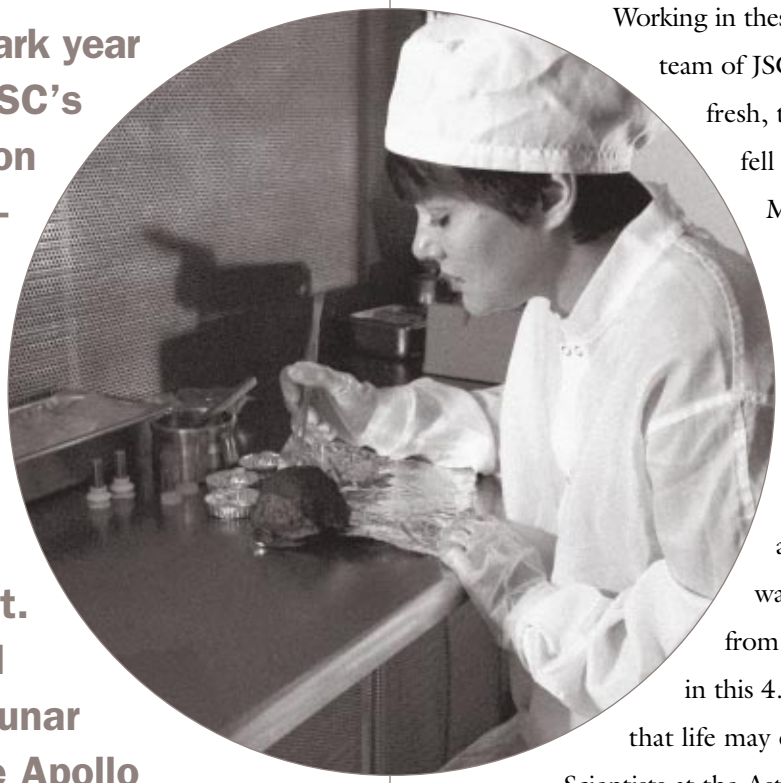
Frontiers of Technology

As we develop solutions for the challenges of exploring and settling space, the evolution of spin-off products, medical advances, and discoveries has accelerated. This year, nanotechnology, plasma propulsion, and a new drug delivery system were just a few of the emerging technologies.



In 1999, the unique capabilities of JSC produced more answers about the essence of life and the nature of the universe as well as down-to-earth advances in the field of medicine and human health. Highlights ranged from discoveries in meteorites that hint of life beyond our planet to advances that improve the quality of life today on Earth.

It's been a landmark year for the team at JSC's Meteorite Curation Lab. Major breakthroughs include discoveries of water in ancient meteorites which suggest life may exist beyond our planet. This one-of-a-kind lab also houses lunar samples from the Apollo flights and will soon coordinate handling of Mars samples and samples of solar wind.



Astromaterials

JSC is the location of America's Astromaterials Curation Facility, NASA's home for extraterrestrial materials. This unique facility houses the Lunar Sample Laboratory, the Antarctic Meteorite Laboratory, and the Cosmic Dust Laboratory. Here, researchers work in full smocks ("bunny suits"), caps, and gloves and take an air shower before entering the pristine labs.

Working in these clean-room conditions, a team of JSC scientists began analyzing a fresh, three-day-old meteorite that fell to Earth in March 1998 in Monahans, Texas. They found halite crystals (table salt) inside which contained microscopic bubbles of water. This marked the first time — after searching for generations — that anyone had found liquid water in an object recovered from space. The presence of water in this 4.5-billion-year-old rock hints that life may exist outside our planet.

Scientists at the Astromaterials Curation Facility also laid the foundation for preserving and studying the next generation of extraterrestrial specimens. They prepared new facilities to receive samples that will be brought back from NASA's upcoming sample-retrieving missions to Mars, the first scheduled for 2003, and samples of solar wind to be brought back from the Genesis mission scheduled for 2001.

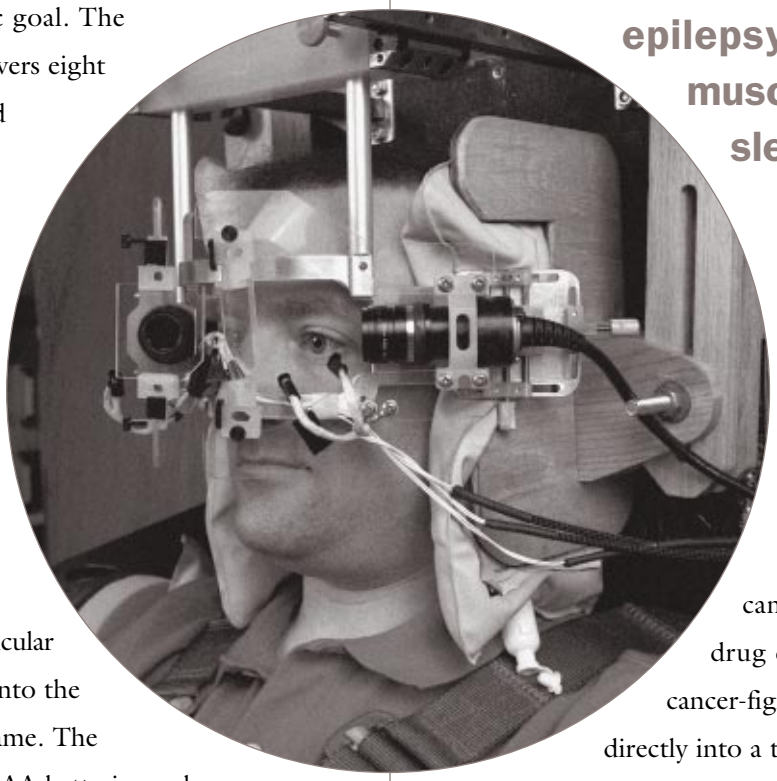
Meteorite Curation Laboratory
You only get one chance to curate and preserve the integrity of "rock" samples so carefully collected from space, and JSC's Meteorite Curation Lab makes sure it's done right.

Biomedical Research

The National Space Biomedical Research Institute (NSBRI), a JSC cooperative partnership managed by Baylor College of Medicine and including 12 other prominent research institutions, completed its second year of study. The NSBRI is responsible for the development of countermeasures against the damaging effects of long-duration space flight and for fundamental and applied space biomedical research directed toward this specific goal. The current research program covers eight disciplines and is conducted by 130 investigators at 27 institutions and government laboratories. More than 250 published papers and books have resulted from the vigorous research activities initiated by the NSBRI.

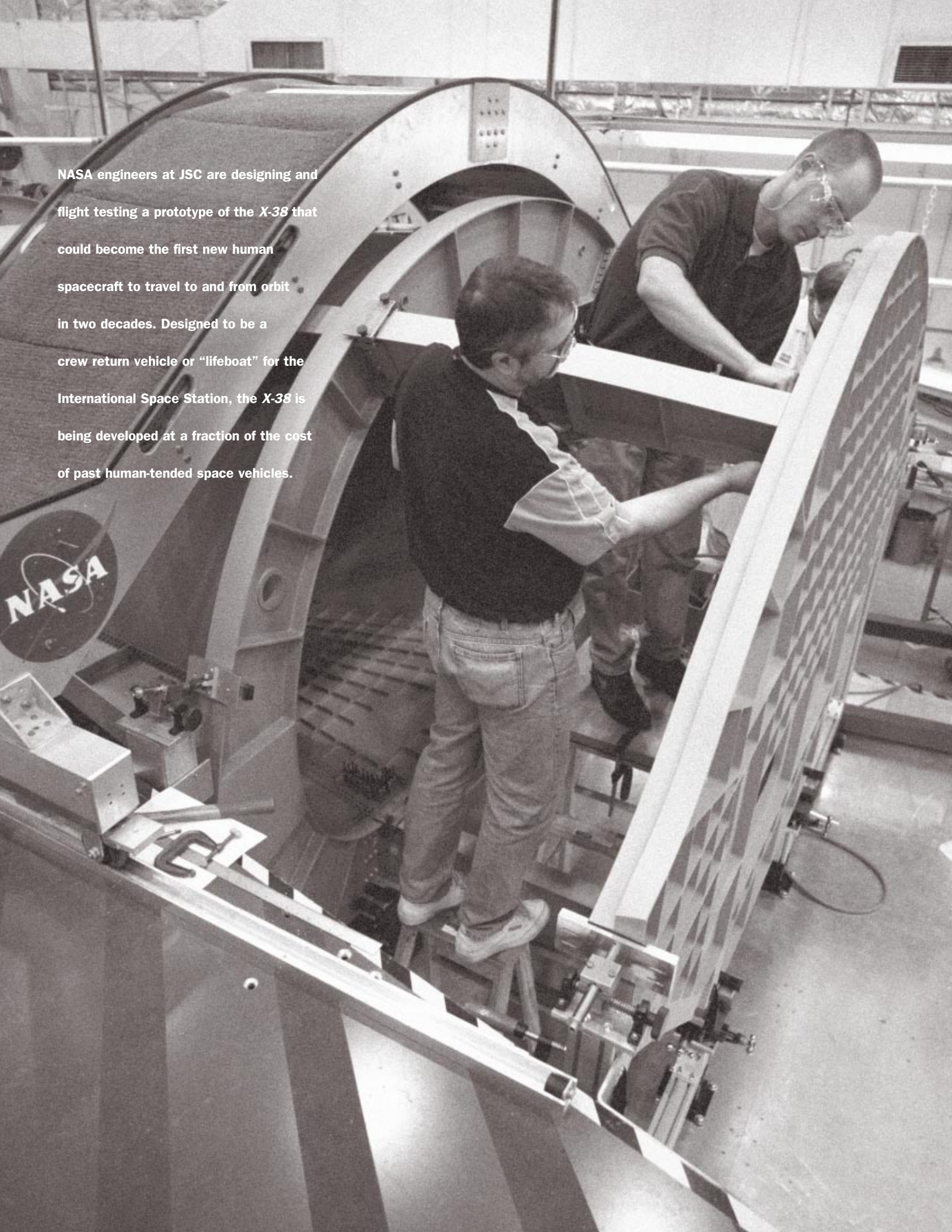
In another area of medical research at JSC, a tiny heart pump, called the NASA/DeBakey VAD (ventricular assist device), was inducted into the Space Technology Hall of Fame. The pump is no bigger than two AA batteries and one-tenth the size of portable heart-assist devices now on the market. Development of this breakthrough required a broad range of skills, both from the NASA team and from Dr. Michael DeBakey and his staff at the Baylor College of Medicine. The pump, used as a bridge device before heart transplants, has been successfully implanted in at least 20 patients to date. About half have gone on to receive heart transplants. NASA holds the patent on the device, which is being successfully developed and marketed by a local start-up company.

In April 1999, preliminary findings were released from the 1998 "Neurolab" mission that increased our understanding of how the human brain performs in space. New answers were revealed for Alzheimer's Disease, epilepsy, brain injuries, muscle atrophy, and sleep deprivation.



Hope for the war on cancer came in the form of a new drug delivery system that allows cancer-fighting drugs to be injected directly into a tumor for sustained release. NASA and Houston's Institute for Research have jointly developed and copatented the new technology for tiny microcapsules, slightly larger than white blood cells and similar to water balloons, that can be injected into an artery leading into a large, solid tumor. With the microcapsules, cancer patients do not have to endure the debilitating side effects of having the anticancer drug circulating throughout their systems. Furthermore,

Biomedical Research
In 1998, a crew of seven astronauts dedicated themselves to furthering our knowledge of the central nervous system by supporting 26 experiments in an ambitious Space Shuttle mission called Neurolab. A preliminary report came back in 1999.



NASA engineers at JSC are designing and flight testing a prototype of the *X-38* that could become the first new human spacecraft to travel to and from orbit in two decades. Designed to be a crew return vehicle or "lifeboat" for the International Space Station, the *X-38* is being developed at a fraction of the cost of past human-tended space vehicles.

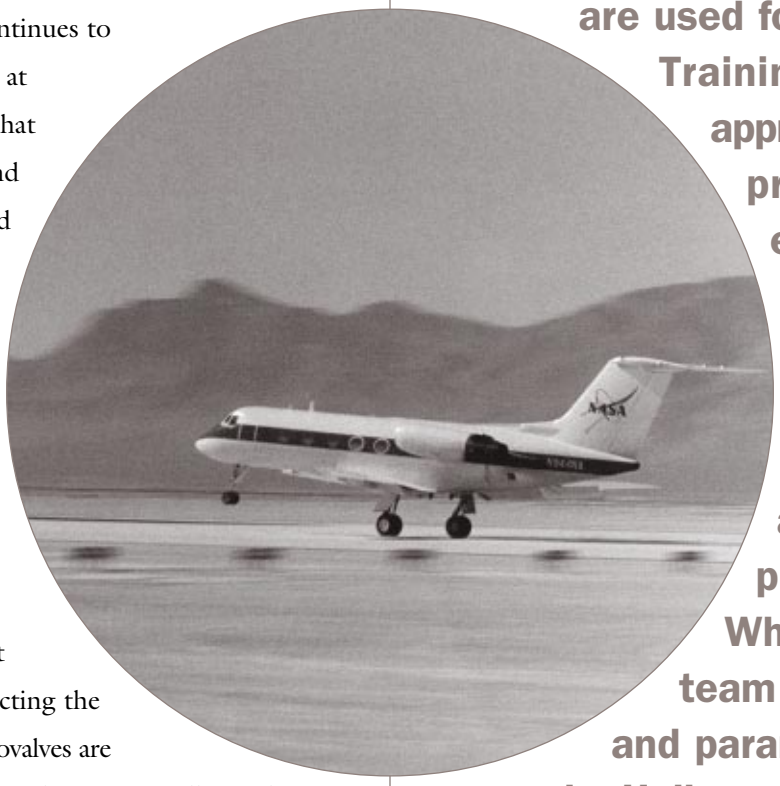
because the tumor is treated directly, only a tiny fraction of the dose required for systemic treatment is required.

Researchers use the weightless environment of space to produce these capsules. Microencapsulation experiments have been flown on nine Shuttle flights, and anticlotting enzymes, antinausea drugs and antibiotics have also been successfully microencapsulated in space.

Technology

Technology development continues to be a dynamic area of growth at Johnson Space Center, one that demonstrates the diversity and uniqueness of its facilities and the high caliber of its teams.

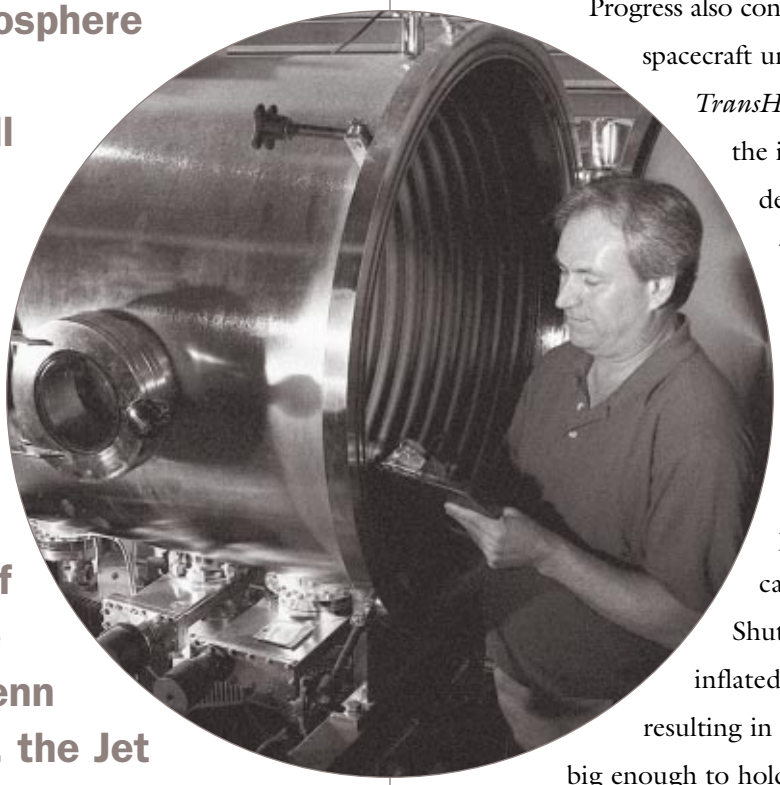
One of JSC's sophisticated research and testing sites is the White Sands Test Facility in Las Cruces, New Mexico, home to a 650-person workforce and a leading center of propulsion technology. One of its recent areas of focus has been perfecting the technology of pyrovalves. Pyrovalves are explosive-actuated, one-time-use devices typically used to begin liquid or gas flow in spacecraft systems, usually after some time of dormancy. They are crucial components for vehicles sent into deep space, which may need to activate propellant and helium pressurization systems after years of inactivity in extreme environments.



While its identity is unknown to many outside the area, the dedication of the team at White Sands Space Harbor, a branch of JSC's White Sands Test Facility, is not. They maintain three laser-level runways in the desert which are used for the Shuttle Training Aircraft approach and landing practice and can even serve as an alternative landing site for Shuttle missions such as STS-3. The professionals at White Sands also team with firefighters and paramedics from nearby Holloman Air Force Base to support training missions with emergency safety procedures.

The White Sands Space Harbor
Shuttle Training Aircraft performing typical training approach.

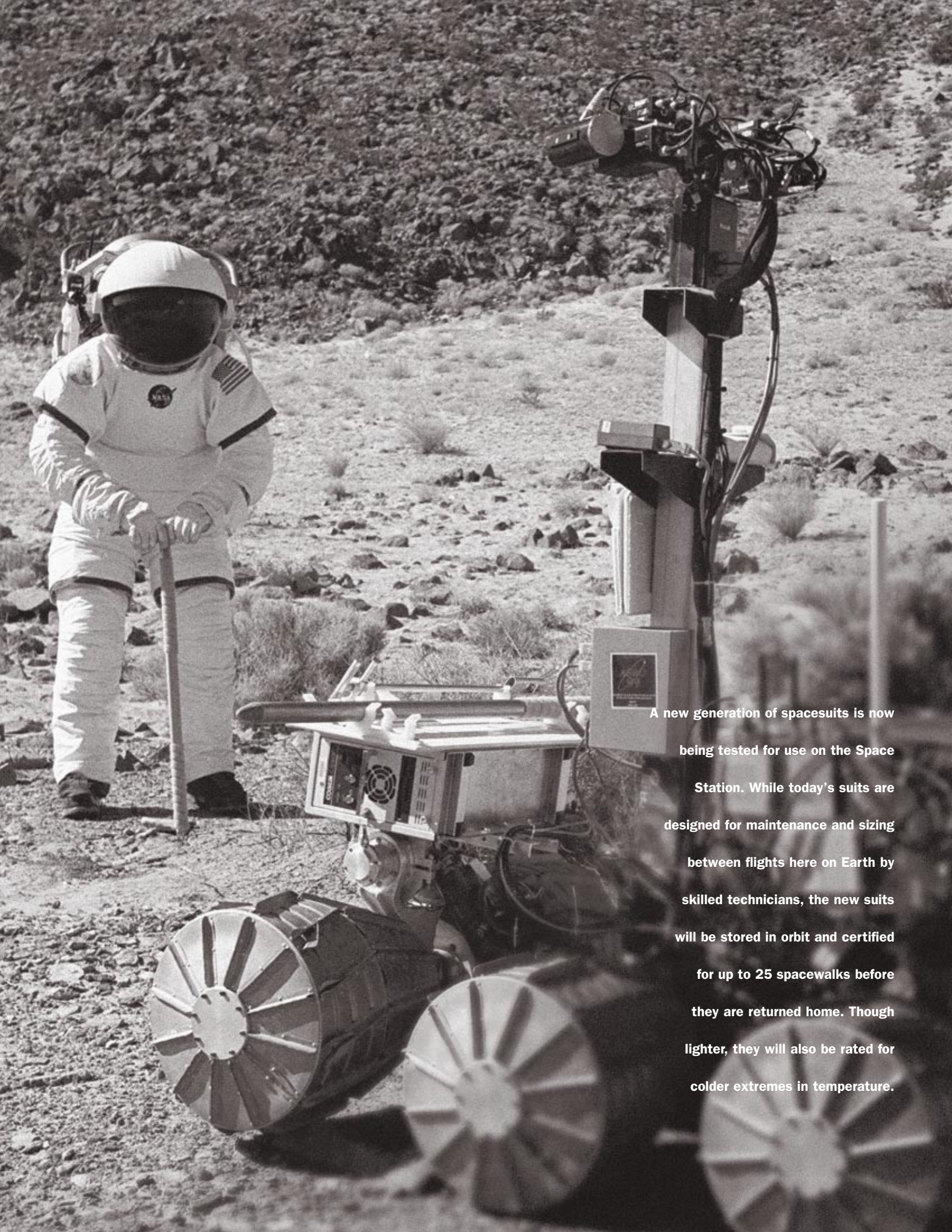
They are a very down-to-earth group, but for the last 2 years, a NASA team led by Project Manager Jim Ratliff has been working on a device called the Mars In-situ Propellant Production Precursor, which successfully turned Martian-like atmosphere into oxygen. The device, which will be carried to the planet aboard the Mars Surveyor 2001, will perform five experiments on Mars. Designers and developers of the project come from JSC, the Glenn Research Center, the Jet Propulsion Lab, and the University of Arizona.



At the JSC campus in Houston, Texas, progress continued on the development of the *X-38* Crew Return Vehicle, an innovative spacecraft designed to be a "lifeboat" for the International Space Station. It marks the first time a prototype spacecraft has ever been built at JSC. With an eye for efficiency, the *X-38* uses available equipment and developed technology in as much as 80 percent of its design.

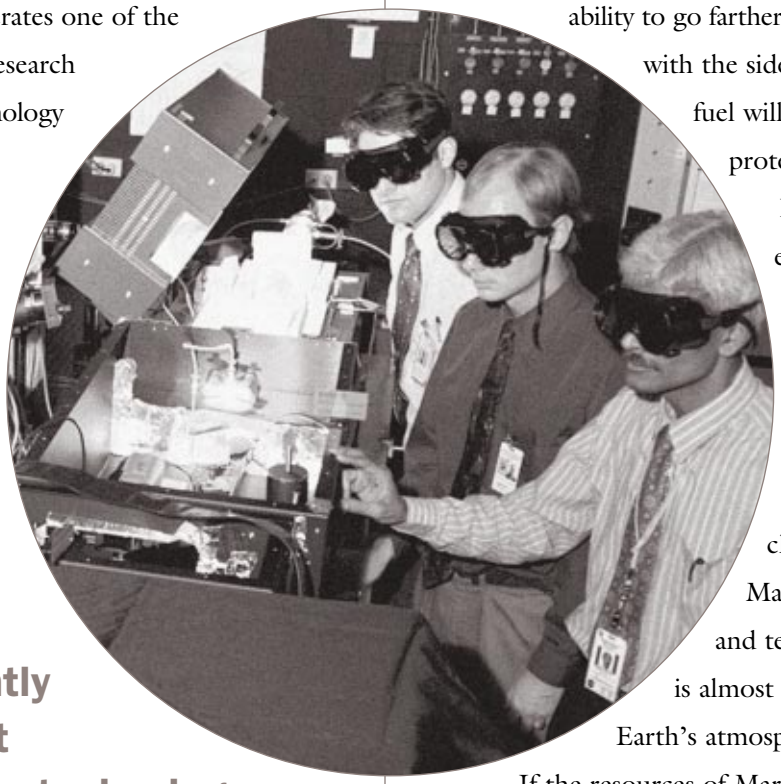
Progress also continued on another important spacecraft under development, the *TransHab*. A full-scale model of the inflatable *TransHab* was deployed and successfully tested in the Center's Space Simulation Chamber. In less than a year, an internal team of engineers at JSC designed and fabricated the three-story-tall prototype. It would be carried aboard the Space Shuttle, deployed in space, and inflated to its operational pressure, resulting in a 27-foot-diameter module, big enough to hold an entire ISS crew and a changeover crew at the same time. The huge *TransHab* prototype first underwent two successful tests in JSC's Neutral Buoyancy Lab, demonstrating the structural integrity of its outside fabric structure to a safety factor of four atmospheres (no aluminum space module has done this).

Mars Environment Chamber
In a unique lab that recreates the thin, cold atmosphere of Mars, JSC scientists were able to successfully manufacture oxygen.



A new generation of spacesuits is now being tested for use on the Space Station. While today's suits are designed for maintenance and sizing between flights here on Earth by skilled technicians, the new suits will be stored in orbit and certified for up to 25 spacewalks before they are returned home. Though lighter, they will also be rated for colder extremes in temperature.

In materials science, the development of nanotechnology at JSC represents potentially huge technological advancements in one of the world's smallest packages. Carbon nanotubes, or fullerene fibers, are microscopic fibers a billionth of a meter in diameter. They exhibit electrical conductivity as high as that of copper and thermal conductivity as high as that of a diamond, and they are potentially 30 to 100 times stronger than steel at one-sixth its weight. JSC operates one of the world's few comprehensive research facilities devoted to nanotechnology and is a collaborative partner with Rice University's Nobel Prize-winning team.



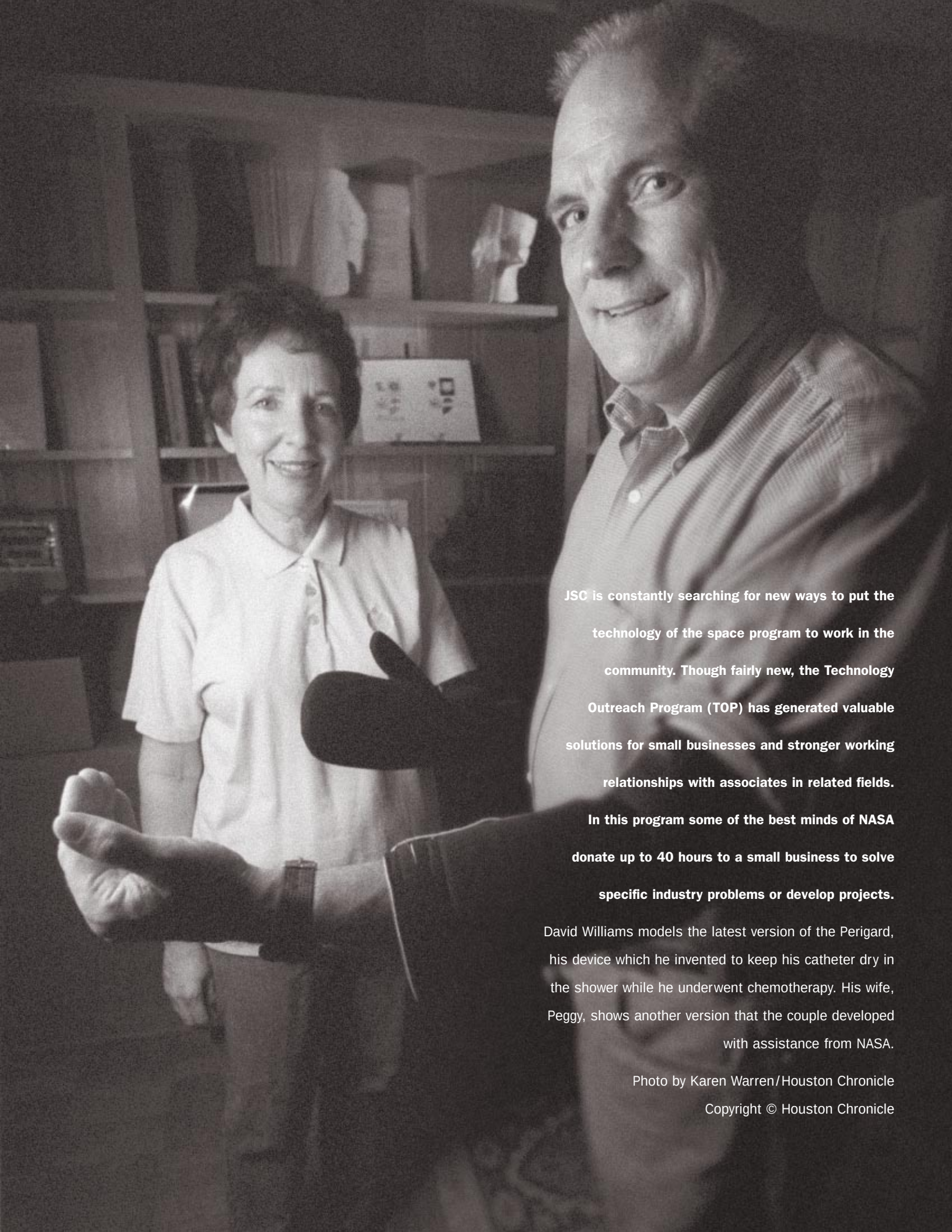
With researchers from Rice University as our partners, NASA scientists at JSC are currently making important discoveries in nanotechnology, which involves tubular microscopic fibers a billionth of a meter in diameter.

On a different front, a team of 20 veteran scientists and engineers at JSC and student researchers made exciting strides in the field of advanced space propulsion with their work with "the fourth state of matter," plasma. Although relatively scarce on Earth, appearing as the glowing material inside flames and lightning, plasma makes up 99 percent of the universe, including the sun and stars. This new propulsion technology promises faster space travel and the ability to go farther with increased load capacity, with the side benefit that the hydrogen fuel will offer effective radiation protection for astronauts.

Looking ahead, JSC engineers successfully tested a device that can produce oxygen out of the thin air on Mars. The Mars In-situ Propellant Production device was tested in a chamber that simulated Martian atmospheric pressures and temperatures. The Mars mix is almost 150 times thinner than Earth's atmosphere and much colder.

If the resources of Mars can be used to produce oxygen for breathing and propellants, it could greatly reduce the mass of materials needed to support a human mission to our closest neighboring planet.

Nanotube Development
William Holmes, Brad Files, and Sivaram Arepalli work in the nanotube production laboratory. Though the fibers measure less than a billionth of a meter in diameter, scientists know they are potentially 30 to 100 times stronger than steel, with one-sixth of the weight.



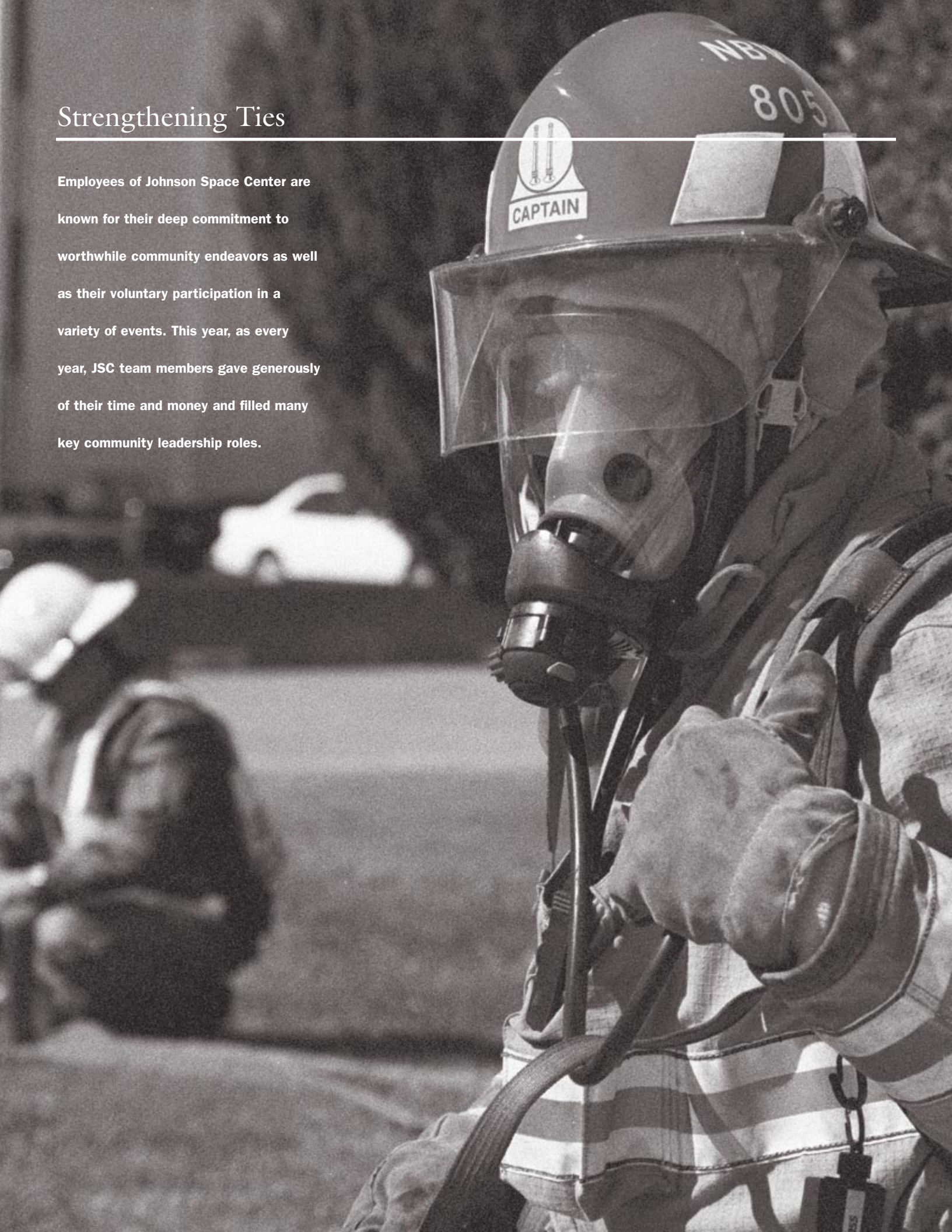
JSC is constantly searching for new ways to put the technology of the space program to work in the community. Though fairly new, the Technology Outreach Program (TOP) has generated valuable solutions for small businesses and stronger working relationships with associates in related fields. In this program some of the best minds of NASA donate up to 40 hours to a small business to solve specific industry problems or develop projects.

David Williams models the latest version of the Perigard, his device which he invented to keep his catheter dry in the shower while he underwent chemotherapy. His wife, Peggy, shows another version that the couple developed with assistance from NASA.

Photo by Karen Warren/Houston Chronicle

Strengthening Ties

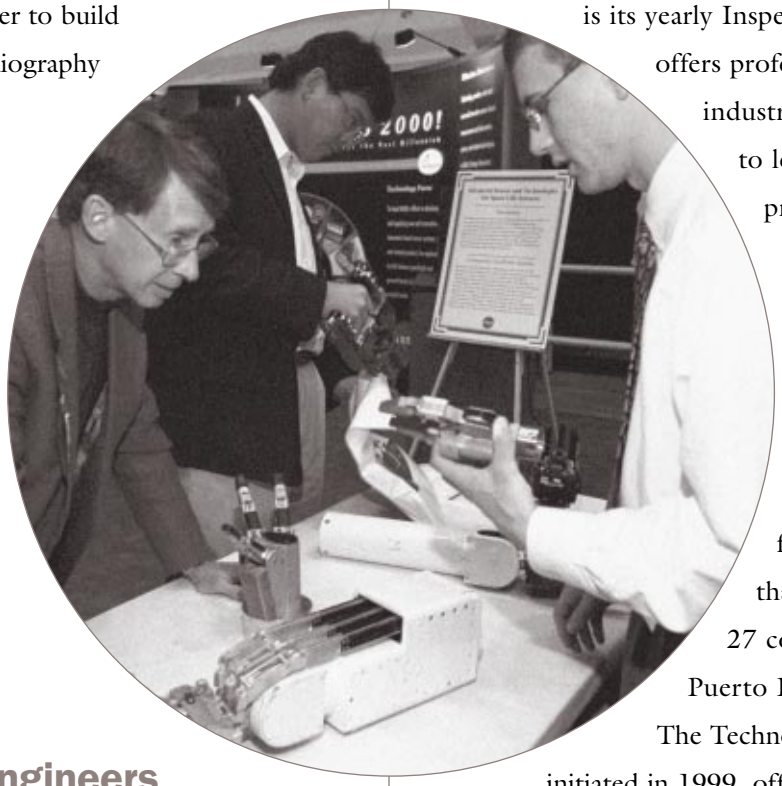
Employees of Johnson Space Center are known for their deep commitment to worthwhile community endeavors as well as their voluntary participation in a variety of events. This year, as every year, JSC team members gave generously of their time and money and filled many key community leadership roles.



A primary goal of the space program is to make life better on Earth by sharing advanced technologies and fostering successful applications as new products and services. The people of Johnson Space Center demonstrate their commitment to strengthening ties with the community by sharing resources, technology, ideas, and their own time.

With the help of JSC flight controllers, Texas Children's Hospital used the design and the operating principles of the Mission Control Center to build a new cutting-edge echocardiography lab, which better serves the medical professionals and its young patients.

Using fabrics that are used in spacesuits to resist the intense ultraviolet sunlight in space, JSC engineers developed sunproof playsuits complete with air conditioning for children who suffer from a light-sensitivity disorder.



In 1999, NASA engineers unveiled "The Almost Human Hand." Teleoperated by virtual-reality immersion, it manipulates wrenches, scissors, drills, and light bulbs, and can even perform an injection using a syringe.

Open House is a yearly event at Johnson Space Center designed to give the general public an inside look at the space program and the spin-offs that have been derived from NASA research. Held in August, it is a labor of love by more than 2,800 volunteers. The 1999 Open House attracted a record crowd of 120,000 visitors from across Texas and around the world.

The Center's primary forum for technology sharing is its yearly Inspection. This free event offers professionals from government, industry, and academia a chance to learn about tools and processes developed for the space program, tour the Space Center, and talk with scientists and engineers. Inspection '99, a 3-day event organized and hosted by volunteers from JSC, attracted more than 2,500 visitors from 27 countries, 44 states, and Puerto Rico.

The Technology Outreach Program, initiated in 1999, offers JSC the chance to return the benefits of the space program to the general public by providing small businesses a chance to team up directly with engineers, scientists, and technicians to solve business and technical problems. These entrepreneurs work with a project team that donates up to 40 hours of valuable time.

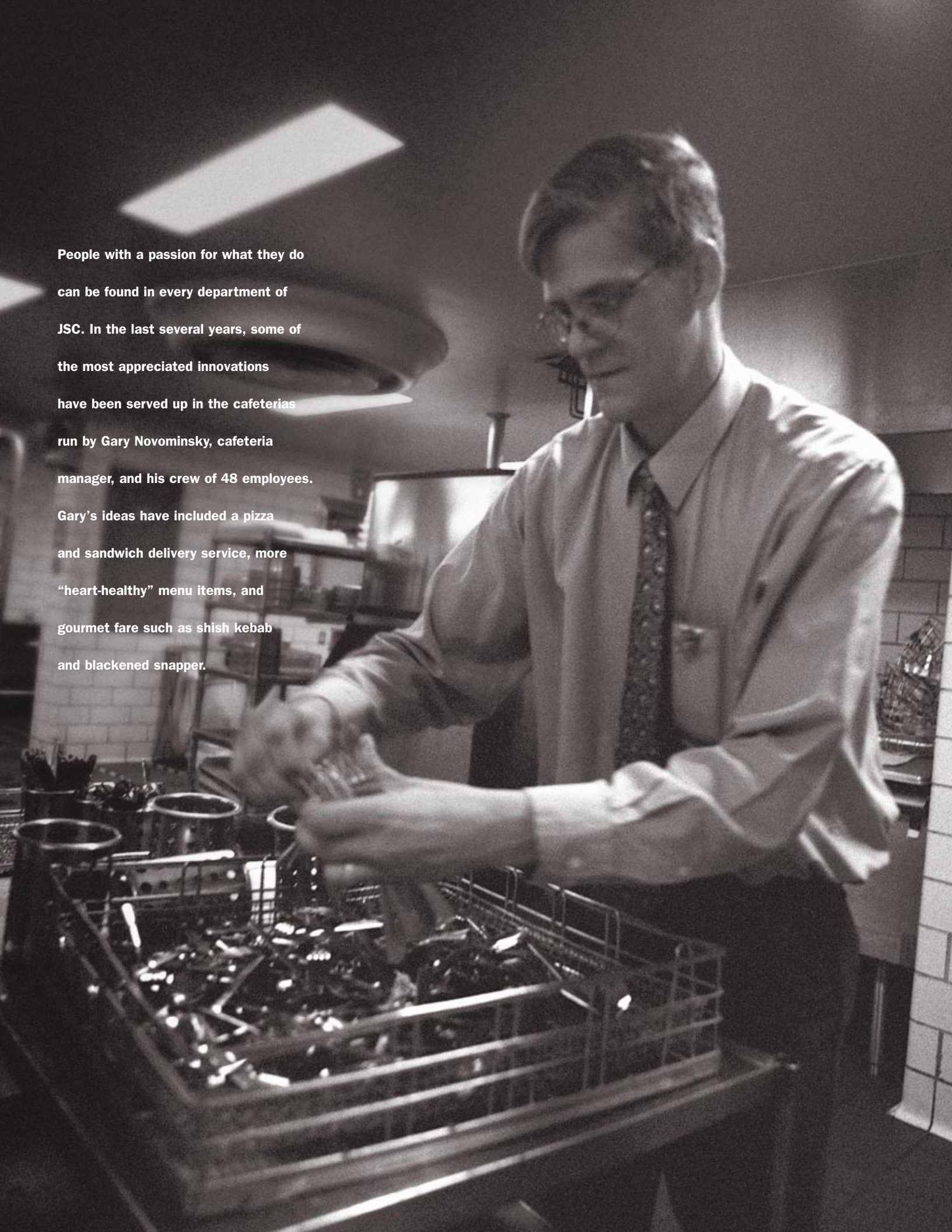
Inspection '99
JSC's yearly Inspection event drew another record crowd in 1999. Industry leaders and entrepreneurs alike had a chance to talk to the engineers and scientists responsible for emerging technologies such as this robotic "The Almost Human Hand."

As an extension of its commitment to safety, the Johnson Space Center has partnered with local communities. In the event of a range of natural and industrial emergencies that could affect the area, neighboring communities are invited to share JSC's state-of-the-art, 4000-square-foot Emergency Operations Center.

Members of the JSC team help host several rodeo-themed events each year including a trail ride, a barbecue and dance, love country-and-western bands, and roping demonstrations. These activities support the efforts of the Houston Livestock Show and Rodeo which provides numerous college scholarships to area students.

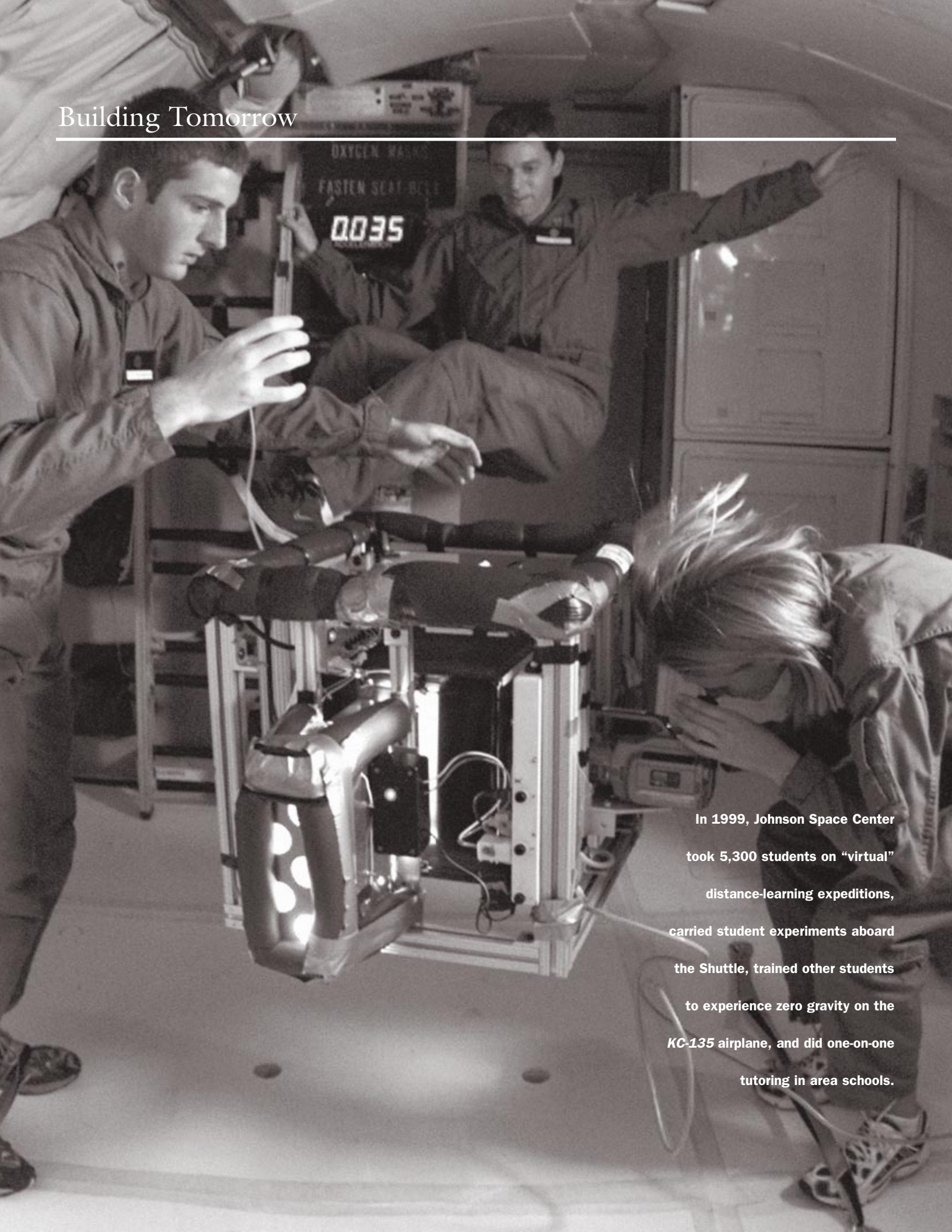
In its first year of activity, JSC's Science Advisor (SciAd) program has already proven its value to everyone involved. Working with the Clear Creek Independent School District, the SciAds sponsored a robot-building and -programming contest. A team of intermediate-school students assembled a "smart machine" that might actually make it to Mars. The "Mars Smart Grabber" looks for items and, upon finding them, decides whether or not to pick them up, then moves them to a work area.

SciAd
In the first year of the program here at JSC, 100 employees volunteered to be SciAds, or Science Advisors, in the Clear Creek Independent School District.



People with a passion for what they do can be found in every department of JSC. In the last several years, some of the most appreciated innovations have been served up in the cafeterias run by Gary Novominsky, cafeteria manager, and his crew of 48 employees. Gary's ideas have included a pizza and sandwich delivery service, more "heart-healthy" menu items, and gourmet fare such as shish kebab and blackened snapper.

Building Tomorrow



In 1999, Johnson Space Center took 5,300 students on "virtual" distance-learning expeditions, carried student experiments aboard the Shuttle, trained other students to experience zero gravity on the *KC-135* airplane, and did one-on-one tutoring in area schools.

Johnson Space Center is a leader in educational excellence, serving as a resource, collaborator, and hands-on laboratory for students, educators, and administrators throughout the nation and around the world. Educational activities can involve astronauts on board the Space Shuttle, at schools and universities, at family entertainment venues, and on the Internet.

JSC is involved in the international JASON Program, a joint project of the Space Center, The JASON Foundation, and its corporate sponsors. For a 2-week period last spring, more than 5,300 students participated in "virtual field trips" in a JSC auditorium, joined remotely by thousands of students worldwide.

The Reduced Gravity Student Flight Opportunities Program is designed to give students practical as well as theoretical knowledge of science. Overseen by the Texas Space Grant Consortium, more than 70 teams of high school and college students performed experiments in the temporary absence of gravity aboard NASA's *KC-135* aircraft.

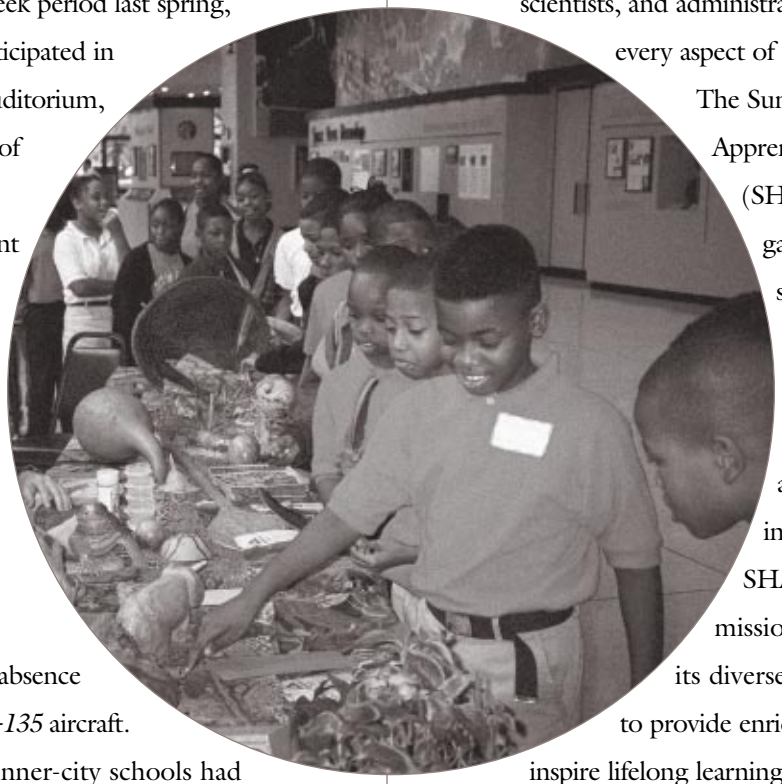
A group of students from inner-city schools had an experience of a lifetime as they participated in the first annual Monica Lamb/NASA Science and Basketball Camp, sponsored by Texas Southern University and NASA, with guest appearances by the Houston Comets. About 100 students took part in the camp, designed to give students a full week of intensive, but fun, hands-on science projects with an emphasis on teamwork and NASA-specific projects.

The year saw another first as JSC hosted the first annual Mars Settlement Design Competition. For one weekend in February, 80 Houston high school students participated in a competition to design a Martian habitat.

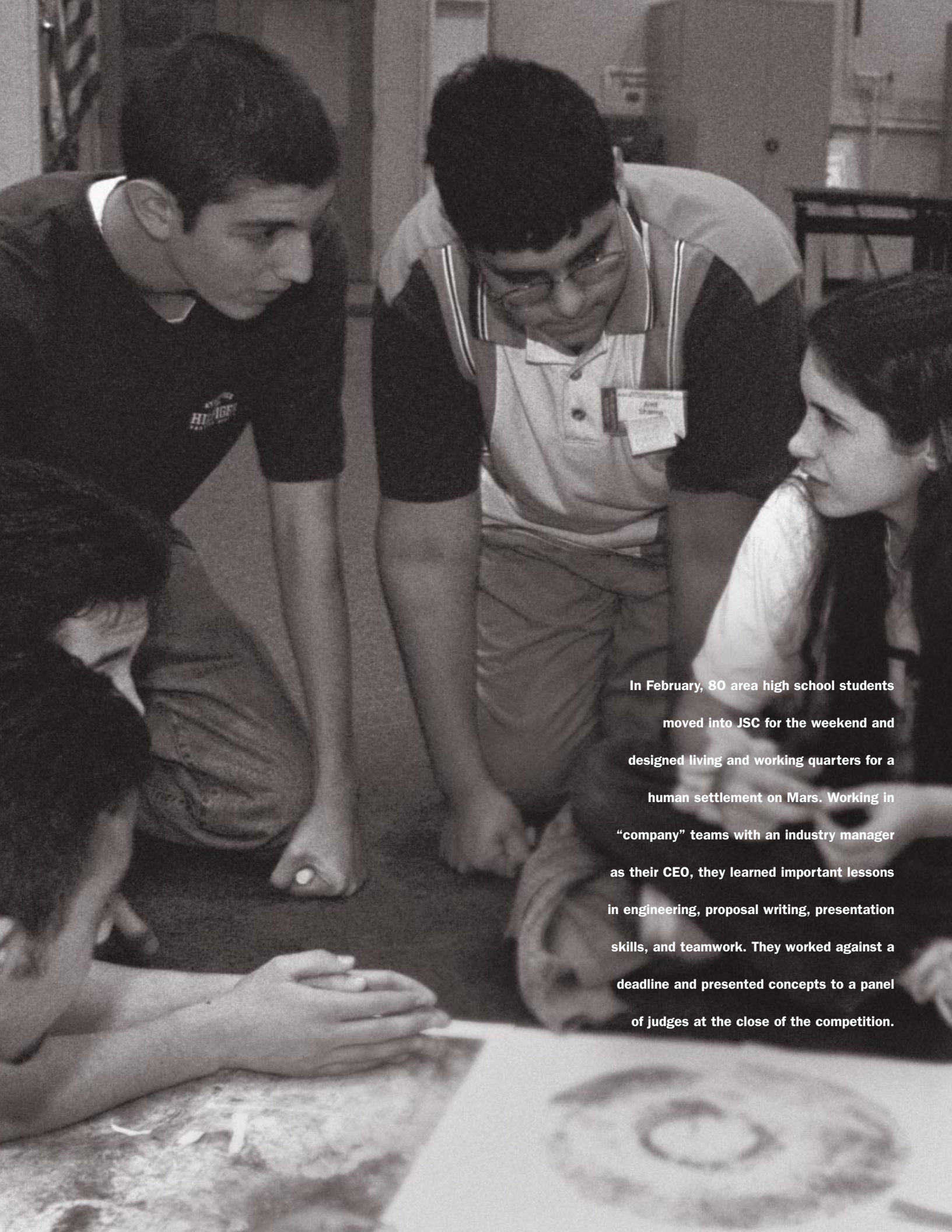
JSC's Cooperative Education Program involves about 150 college students from 45 schools around the country. These students alternate between semesters at school and full-time work at JSC. They work side by side with JSC engineers, scientists, and administrators, and get involved in every aspect of the work of the Space Center.

The Summer High School and Apprenticeship Research Program (SHARP), now in its 19th year, gave 14 area high school students a similar opportunity. It's designed as a summer internship for students who have demonstrated an aptitude for and an interest in science and engineering. SHARP uses NASA's inspiring mission, its unique facilities, and its diverse and specialized workforce to provide enrichment experiences and to inspire lifelong learning.

In 1999, JSC launched the Science Advisor, or SciAd, program in 8 intermediate schools and 18 elementary schools in the Clear Lake area. In this unique program, JSC volunteers serve as long-term technical advisors to the students and teachers in assigned schools. The program began at the White Sands Test Facility in 1990 and proved so successful that it was adopted in the Clear Lake area. Each SciAd volunteer



JASON Program
The JASON Program, a project of the JASON Foundation, NASA, and corporate sponsors, gives students a chance to go on their own personal journeys of discovery.

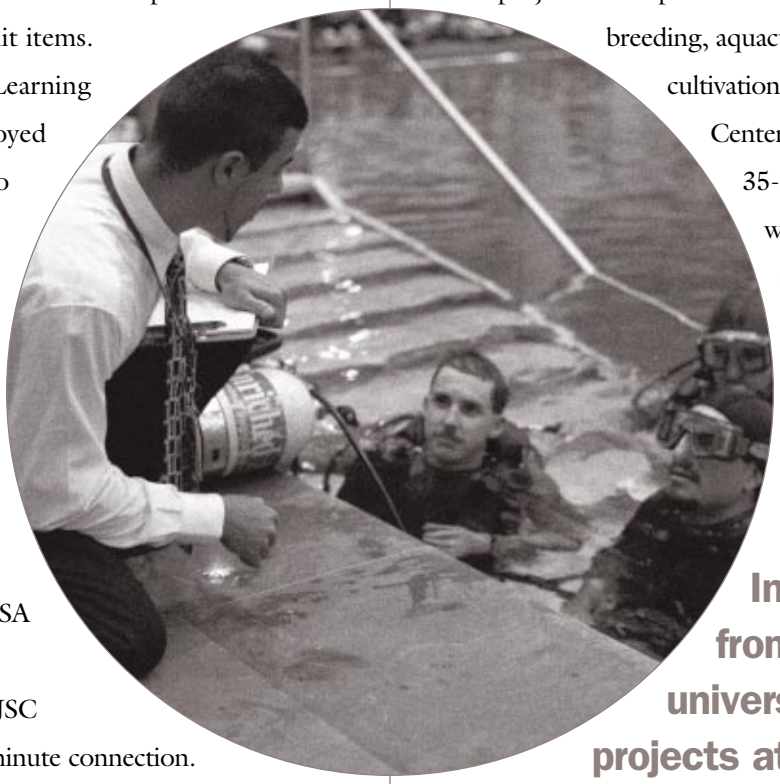


In February, 80 area high school students moved into JSC for the weekend and designed living and working quarters for a human settlement on Mars. Working in "company" teams with an industry manager as their CEO, they learned important lessons in engineering, proposal writing, presentation skills, and teamwork. They worked against a deadline and presented concepts to a panel of judges at the close of the competition.

can dedicate 8 hours a month of paid time to the program. The SciAds are available to the schools to help teachers both inside and outside of the classroom.

During National Engineers Week, more than 100 Houston-area schools responded to JSC's invitation to participate in the program. Some 175 civil servants and contractor employees shared their unique, space-related knowledge with students and teachers, using a variety of hands-on experiments and visual props, like spacesuit items.

Last year, JSC's Distance Learning and Education Project employed teleconferencing technology to bring the challenges of the space program to more than 5,000 students in classrooms across the nation and in seven foreign countries. Students took a cyber tour of the full-sized training models of the International Space Station, talked with NASA engineers and scientists, and experienced a brief history of JSC during a live, interactive, 45-minute connection.



The project created new, original video teleconference events on the topics of microgravity and geography. These educational events offered the students an opportunity to talk with astronauts, question experts, and view action in the Neutral Buoyancy Lab and the Mission Control Center, while delivering educational content that fully meets the requirements of national standards.

Development of the Longhorn Project, which builds on Texas' past to secure its future, gathered momentum with the addition of animals and improvements on the site. The project is a joint effort of the Clear Creek Independent School District, the Johnson Space Center, the Houston Livestock Show and Rodeo, and the Texas Longhorn Breeders Association of America. It is a first-of-its-kind facility for furthering agricultural education at the high school level. The project will help students learn about cattle care and breeding, aquaculture, and fruit and vegetable cultivation. The 60-acre site, near the Center's Rocket Park, includes a 35-acre pasture, a 10-acre wildlife habitat pond, an 8-acre feedlot with a barn and a storage shed, and 7 acres for aquaculture ponds, gardens, orchards, a processing lab, and a greenhouse.

In 1999, students from 45 colleges and universities worked on projects at JSC as part of the Cooperative Education Program. As Co-op Jennifer Glassley said, "I can't imagine a job where it's not common to run around in a spacesuit, fly on the *KC-135,* or swim in the Neutral Buoyancy Lab. This program was the best decision I ever made."

Cooperative Education Program
JSC's co-ops are college and university students who take a break from their regular classes to immerse themselves in the important work of NASA and become part of a project team.

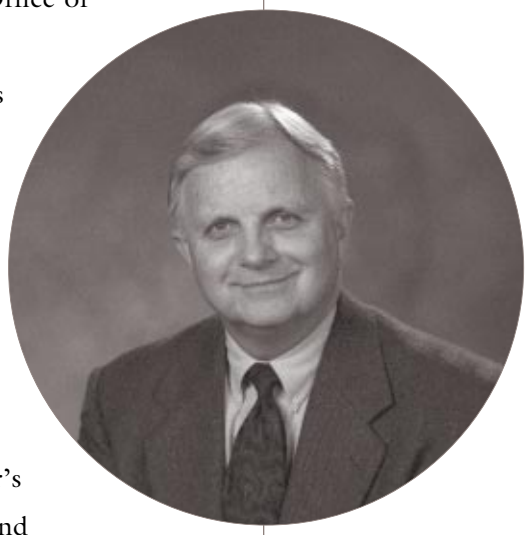
Financials

As the Lyndon B. Johnson Space Center (JSC) Chief Financial Officer, I am pleased to present this annual report for Fiscal Year 1999. The financial statements provide the Center's results of operation and financial position for the year — reflecting our Center's unique mission and leadership in the aerospace industry.

At JSC we always strive for excellence and look for ways to continuously improve our processes. As the newly appointed Chief Financial Officer, I established several teams within the Office of the Chief Financial Officer to look at ways to streamline our work processes and redesign our functions. Reinventing how we do business is especially important in today's environment in order to step up to more demanding and challenging workloads. Our redesign goal is to continue to provide the right level of support to help manage the Center's responsibility for multiple programs and projects. We must also devise new and creative methods to absorb the impact brought by continued downsizing of our workforce. The efforts of the streamlining and redesign teams resulted in a number of opportunities for improvement. By focusing on streamlining and redesign of our work processes, I feel confident our overall ability to provide resource and financial management support to the Center will continue to be of the absolute highest quality.

Fiscal Year 1999 was a challenging and exciting year for the Johnson Space Center. The financial state of health at Johnson Space Center is good. We are looking forward to new challenges in the next century.

John H. Beall



Johnson Space Center Chief Financial Officer John H. Beall

Statement of Financial Position

as of September 30 (In Thousands)

Assets:	1999	1998
Intragovernmental Assets:		
Fund Balance with U.S. Treasury (Note 2)	$ 1,236,169	$ 1,265,755
Accounts Receivable, Net (Note 3)	1,771	1,833
Advances and Prepayments	12,613	15,457
Governmental Assets:		
Accounts Receivable, Net (Note 3)	1,025	1,296
Operating Materials and Supplies (Note 4)	2,365	2,597
Property, Plant, and Equipment, Net (Note 5)	10,528,577	10,292,069
Other Assets (Note 6)	700,704	751,018
Total Assets	$ 12,483,224	$ 12,330,025
Liabilities:		
Liabilities Covered by Budgetary Resources:		
Intragovernmental Liabilities:		
Accounts Payable	13,251	14,079
Other Liabilities (Note 7)	7	15
Governmental Liabilities:		
Accounts Payable	727,885	726,699
Other Liabilities (Note 7)	22,941	20,083
Total	$ 764,084	$ 760,876
Liabilities Not Covered by Budgetary Resources:		
Intragovernmental Liabilities:		
Other Liabilities (Note 7)	91	91
Governmental Liabilities:		
Other Liabilities (Note 7)	34,913	34,429
Total	$ 35,004	$ 34,520
Total Liabilities	$ 799,088	$ 795,396
Net Position:		
Balances		
Unexpended Appropriations	487,493	523,465
Invested Capital	11,231,112	11,039,620
Donated Property	535	6,064
Future Funding Requirements	(35,004)	(34,520)
Total Net Position (Note 8)	$ 11,684,136	$ 11,534,629
Total Liabilities and Net Position	$ 12,483,224	$ 12,330,025

The accompanying notes are an integral part of these statements. These statements are for internal use and have not been audited.

Statement of Operations and Changes in Net Position

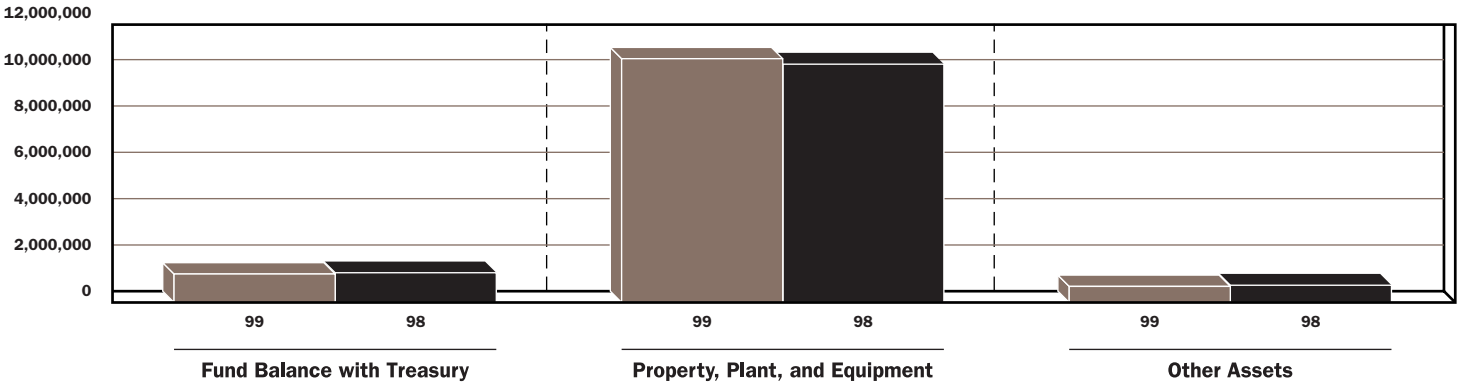
for the year ended September 30 (In Thousands)

	1999	1998
Revenues and Financing Sources:		
Appropriated Capital Used	$ 4,037,430	$ 4,009,008
Revenues from Sales of Goods and Services		
To the Public	8,249	9,086
Intragovernmental	37,101	10,192
Total Revenues and Financing Sources	$ 4,082,780	$ 4,028,286
Expenses:		
Program or Operating Expenses		
Science, Aeronautics, and Technology	196,467	117,383
Human Space Flight	3,471,323	3,528,246
Mission Support	369,511	359,390
Research and Development	(853)	28
Space Flight Control and Data Communications	(1,583)	1,476
Construction of Facilities	2,616	2,621
Research and Program Management	(51)	(136)
Total Program or Operating Expenses	4,037,430	4,009,008
Reimbursable Expenses	45,350	19,278
Total Expenses	$ 4,082,780	$ 4,028,286
Excess (Shortage) of Revenues and Financing Sources Over Total Expenses	0	0
Non-Operating Changes:		
Unexpended Appropriations	(35,972)	(102,003)
Donated Property	(5,529)	5,077
Invested Capital	191,492	506,240
Future Funding Requirements	(484)	2,838
Total Non-Operating Changes	$ 149,507	$ 412,152
Excess (Shortage) of Revenues & Financing Sources Over Total Expenses and Non-Operating Changes	149,507	412,152
Net Position, Beginning Balance	11,534,629	11,122,477
Net Position, Ending Balance	$ 11,684,136	$ 11,534,629

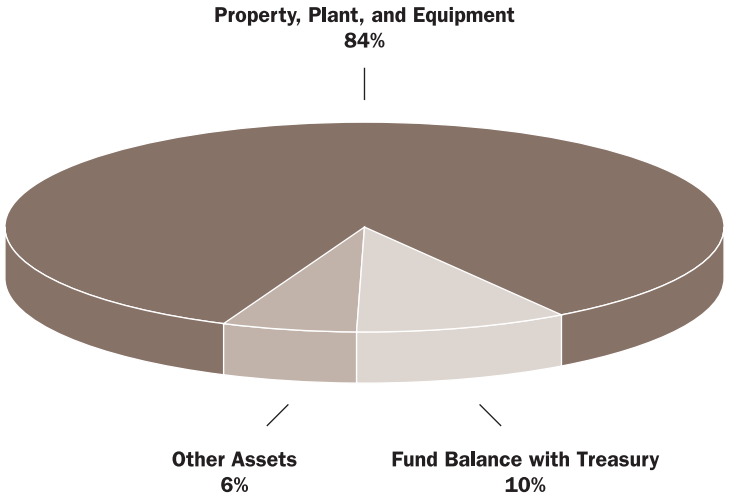
The accompanying notes are an integral part of these statements. These statements are for internal use and have not been audited.

Financial Highlights

	1999	1998	% Change
Fund Balance with Treasury	$ 1,236,169	$ 1,265,755	(2%)
Property, Plant, and Equipment	$ 10,528,577	$ 10,292,069	2%
Other Assets	$ 700,704	$ 751,018	(7%)



	1999	1998	% Change
Assets	$ 12,483,224	$ 12,330,025	1%
Liabilities	$ 799,088	$ 795,396	0%
Net Position	**$ 11,684,136**	**$ 11,534,629**	1%



for the years ended September 30, 1999 and 1998

Note 1. Summary of Significant Accounting Policies

Basis of Presentation

These financial statements were prepared to report the financial position and results of operations of Johnson Space Center (JSC). They were prepared from the books and records of JSC in accordance with the form and content for entity financial statements specified by Office of Management and Budget (OMB) Bulletin 94-01 and JSC's accounting policies which are summarized in this note.

Reporting Entity

JSC is 1 of 10 NASA field centers established to aid NASA in its mission to provide for aeronautical and space activities. The Johnson Space Center's accounting system, called the Interactive Basic Accounting System (IBAS), is a mechanized system that uses the single-source data entry concept to reduce the redundancy of data entry. Multiple transactions are entered into the system simultaneously using transaction codes that instruct the system to post debits and credits to the appropriate general ledger accounts. JSC's systems provide payroll and labor accounting for approximately 3,200 employees and process approximately 300,000 non-payroll-related accounting transactions monthly. These transactions update the Financial and Contractual Status (FACS) report and the General Ledger. This data provides the basic information necessary to meet internal and external financial reporting requirements and provides both fund control and accountability.

There are seven basic appropriations that require individual treatment in the JSC system of accounting and control. They are Science, Aeronautics, and Technology (SAT), Human Space Flight (HSF), Mission Support (MS), Space Flight Control and Data Communications (SFCDC), Research and Development (R&D), Research and Program Management (R&PM), and Construction of Facilities (C of F).

The SAT appropriation for program years 1995 and forward provides funding for research and development activities. This includes funds to:

- extend our knowledge of the Earth, its space environment, and the universe;
- invest in new aeronautics and advanced space technologies that support the development and application of technologies critical to the economic, scientific, and technical competitiveness of the United States.

The HSF appropriation for program years 1995 and forward provides funding for human space flight activities. This includes funding for:

- the International Space Station
- the Space Shuttle Program
- payload and utilization operations
- flight support for cooperative programs with Russia.

The MS appropriation for program years 1995 and forward provides funding for:

- the civil service workforce
- space communication services
- safety and quality assurance activities
- maintenance activities.

The SFCDC appropriation for program years 1994 and prior provides funding for:

- space flight
- spacecraft control and communication activities
- operations, production services, and other activities related to space flight.

The R&D appropriation for program years 1994 and prior provides funding for:

- research and development of space vehicles
- space systems
- other related activities.

The R&PM appropriation for program years 1994 and prior provides funding for:

- civil service salary
- civil service travel
- related expenses for civil servants required to manage and conduct programs.

The C of F appropriation for program years 1994 and prior provides funding for:

- construction, repair, rehabilitation, and modification of facilities
- minor construction of new facilities
- additions to existing facilities
- facility planning and design.

In addition to the basic operating programs described above, the JSC financial management program included reimbursable activity of approximately $45 million during FY 1999. The reimbursable program requires special management reports to monitor advance payments from customers maintained on deposit with the U.S. Treasury.

Basis of Accounting

JSC records transactions on an accrual accounting basis and a budgetary basis. Under the accrual method, revenues are recognized when earned and expenses are recognized when a liability is incurred, without regard to receipt or payment of cash. Budgetary accounting facilitates compliance with legal constraints and controls over the use of federal funds.

Revenues and Other Financing Sources

JSC receives the majority of the funding needed to support its programs through appropriations. JSC receives both annual and multi-year appropriations that we use, within statutory limits, for operating and capital expenditures. We obtain additional amounts through reimbursements for services performed for the public and other federal agencies.

Funds with the U.S. Treasury

JSC does not have disbursing authority and does not maintain cash in commercial bank accounts. The U.S. Treasury processes all cash receipts and disbursements. The funds with the U.S. Treasury include appropriated funds and deposit funds received from the public as advance payments for reimbursable services.

Advances

For the most part, JSC funds its University Contracts and Grants program through the use of a letter of credit system and the automated clearinghouse method of providing advance payments of federal funds to recipient organizations. Recipients are required to schedule drawdowns to coincide with actual, immediate cash requirements, in accordance with Department of the Treasury regulations. Quarterly reporting by recipients to NASA is provided on Federal Cash Transactions Reports (SF 272). We maintain detailed accounting records and monitor audits by the Defense Contract Audit Agency and NASA's Office of Inspector General of the grantees.

Accounts Receivable

Most receivables are due from other federal agencies for reimbursement of research and development services related to satellites and launch services. Non-federal customers provide advance payments placed on deposit with the U.S. Treasury until services are performed.

Prepaid Expenses

Payments in advance of the receipt of goods and services are recorded as prepaid charges at the time of prepayment and recognized as expenses when related goods and services are received.

Operating Materials and Supplies

In accordance with Statement of Federal Financial Accounting Standards (SFFAS) Number 3, "Accounting for Inventory and Related Property," materials held by JSC that are repetitively procured, stored, and issued on the basis

of demand are considered Operating Materials and Supplies.

Government-Owned/Contractor-Held inventories are material at both contractor and NASA facilities, but under contractor control and accountability and used for programs and projects under contract.

Property, Plant, and Equipment

NASA-owned Property, Plant, and Equipment is held by JSC and its contractors. Property with a unit cost of $100,000 or more and a useful life of 2 years or more is capitalized. Capitalized cost includes all costs incurred by NASA to bring the property to a form and location suitable for its intended use.

Equipment includes special tooling, special test equipment, and space hardware, such as the Space Shuttle, and other configurations of spacecraft: engines, unlaunched satellites, rockets, and Space Station and other scientific components unique to NASA's space programs. Structures, Facilities, and Leasehold Improvements include buildings with collateral equipment, and capital improvements such as airfields, power distribution systems, flood control, utility systems, roads, and bridges.

Under provisions of the Federal Acquisition Regulation (FAR), contractors are responsible for control over and accountability for Government-owned property in their possession. NASA's contractors report on NASA property in their custody annually, as of September 30, on a NASA Form 1018, NASA Property in the Custody of Contractors. The NASA Form 1018 is certified by the contractor's representative and approved by a Government property administrator.

NASA made significant changes in its property, plant, and equipment accounting and reporting policies and practices in Fiscal Year 1998, to implement the requirements of SFFAS Number 6, "Accounting for Property, Plant, and Equipment," and Number 8, "Supplementary Stewardship Reporting." Major changes included recognizing depreciation, capitalizing assets in space, and reporting heritage assets as Supplementary Stewardship Information. However, JSC only incorporated the capitalization threshold change of $100,000 from $5,000 and the write-off of Heritage assets in this annual report. JSC continues to maintain physical accountability for property, plant, and equipment at lower values.

Liabilities

Accounts payable includes amounts recorded for receipt of goods or services furnished to the Agency, based on billings rendered. Additionally, JSC accrues cost and recognizes liability based on information provided monthly by contractors on NASA Contractor Financial Management Reports (NASA Forms 533M and Q). JSC relies on independent audits by the DCAA to ensure reliability of reported costs and estimates. To provide further assurance, financial managers test the accuracy of cost accruals generated from the NF 533s monthly, and NASA Headquarters independently analyzes the validity of Centers' data.

Liabilities Not Covered by Budgetary Resources

NASA's liabilities not covered by budgetary resources include environmental matters, legal claims, pensions and other retirement benefits (ORB), workers' compensation, annual leave (see discussion below) and closed appropriations.

Employee Benefits

JSC's employees participate in the Civil Service Retirement System (CSRS), a defined benefit plan, or the Federal Employees Retirement System (FERS), a defined benefit and contribution plan. For CSRS employees, NASA makes matching contributions equal to 7 percent of pay. For FERS employees, NASA automatically contributes 1 percent of pay to a retirement savings plan and matches employee contribution up to an additional 4 percent of pay. For FERS employees, NASA also contributes the employer's matching share for Social Security.

Note 2. Fund Balances with U.S. Treasury: (In Thousands)

	1999			
	Obligated	Unobligated Available	Unobligated Restricted	Fund Balance
Appropriated Funds	$ 1,075,793	$ 152,117	$ 8,213	$ 1,236,123
Deposit Accounts				44
Suspense/Clearing Accounts				2
Total				$ 1,236,169

Note 3. Accounts Receivable, Net: (In Thousands)

	1999			
	Entity Accounts Receivable	Non-Entity Accounts Receivable	Allowance for Uncollectible Receivables	Net Amount Due
Intragovernmental	$ 1,736	$ 35	—	$ 1,771
Governmental	999	68	(42)	1,025
Total	$ 2,735	$ 103	$ (42)	$ 2,796

Note 4. Operating Materials and Supplies: (In Thousands)

	1999	1998	Valuation Method
(a) Stores Stock	$ 411	$ 550	Weighted Avg
(b) Standby Stock	1,954	2,047	Weighted Avg
Total	$ 2,365	$ 2,597	

(a) Stores Stock is material being held in inventory by JSC that is repetitively procured, stored, and issued on the basis of recurring demand.

(b) Standby Stock is material held for emergencies whose stock levels are not based on demand criteria.

Note 5. Property, Plant, and Equipment: (In Thousands)

	1999	1998	Change
Government-Owned/Held:			
Land	$ 8,797	$ 8,797	$ —
Structures, Facilities, & Leasehold Improvements	532,913	565,352	(32,439)
Equipment	294,482	286,731	7,751
Construction in Progress	9,630	6,476	3,154
	$ 845,822	$ 867,356	$ (21,534)
Government-Owned/Contractor-Held			
Land	$ 2,141	$ 3,570	$ (1,429)
Structures, Facilities, & Leasehold Improvements	42,262	48,176	(5,914)
Equipment	418,873	602,400	(183,527)
Special Tooling	41,888	43,654	(1,766)
Special Test Equipment	213,775	224,449	(10,674)
Space Hardware	7,933,386	7,303,812	629,574
Construction in Progress	1,030,430	1,198,652	(168,222)
	$ 9,682,755	$ 9,424,713	$ 258,042
Total	$ 10,528,577	$ 10,292,069	$ 236,508

Note 6. Other Assets: (In Thousands)

	1999	1998	Change
Contractor-Held Materials	$ 700,704	$ 751,018	$ (50,314)

Note 7. Other Liabilities: (In Thousands)

	1999		
Liabilities Covered by Budgetary Resources:			
	Current	Non-Current	Total
Intragovernmental Liabilities:			
* Liability for Deposit and Suspense Funds	$ 7	$ —	$ 7
Governmental Liabilities:			
* Liability for Deposit and Suspense Funds	$ 101	$ —	$ 101
Accrued Funded Payroll and Benefits	22,840	—	22,840
Total	$ 22,941	$ —	$ 22,941

Liabilities Not Covered by Budgetary Resources:			
	Current	Non-Current	Total
Intragovernmental Liabilities:			
Accounts Payable for Closed Appropriations	$ —	$ 91	$ 91
Governmental Liabilities:			
Accounts Payable for Closed Appropriations	$ —	$ 10,936	$ 10,936
Unfunded Annual Leave	23,977	0	23,977
Total	$ 23,977	$ 10,936	$ 34,913

*Liabilities include cash advances received from other Government agencies and public reimbursable customers. Also included are funds on deposit with the U.S. Treasury for employees' savings bonds and state tax withholdings.

Note 8. Net Position: (In Thousands)

	1999 Appropriated Funds
Unexpended Appropriations:	
Undelivered	$ 327,163
Unobligated:	
Available	152,117
Unavailable	8,213
Invested Capital	11,231,112
Donated Property	535
Future Funding Requirements:	
Annual Leave	(23,977)
Closed Appropriations	(11,027)
Total	$ 11,684,136

The Chief Financial Officer (CFO) is committed to providing you with the most current information in regard to budget, resources, and financial management activity at JSC.

The JSC CFO is responsible for:

- Implementing overall Agency policies, guidelines, and procedures for budget administration, financial reporting, and financial management systems;
- Maintaining liaison with NASA Headquarters and the Office of Management and Budget (OMB), the Department of Treasury, the General Accounting Office (GAO), and various congressional committees with Agency financial management oversight.

The JSC CFO's priority goals and objectives and related initiatives focus on efficient and effective: (1) Operations; (2) Staff; (3) Systems; (4) Statements and Reporting; (5) Streamlining; and (6) Standards. These goals and objectives are being pursued through several related Agency strategies. JSC's goals, objectives, strategies, and related initiatives also directly support counterpart Federal financial management goals and strategies.

JSC's fundamental financial and resources management goal focuses on efficient and effective support of NASA missions. To achieve and sustain this fundamental goal, JSC must achieve several interrelated goals and objectives by:

(1) effectively and efficiently planning, monitoring, controlling, and managing financial and resources management operations;
(2) maintaining a financial management professional staff with appropriate expertise and excellence;
(3) implementing a flexible, integrated, cost-effective financial system compliant with Federal and Agency standards, and one that provides timely, relevant, and useful information for program and mission support;
(4) providing timely, accurate, useful, reliable, and verifiable external financial statements, financial performance information and internal financial information;
(5) streamlining financial and resources management policies, practices, processes, and operations consistent with legal, regulatory, and related guidance and requirements; and
(6) effectively implementing Federal and Agency standards and initiatives.

In addition, in implementing its financial and resources management activities, JSC must also maintain appropriate mission and customer support and implement all activities consistent with applicable legal and regulatory requirements.

Operations

JSC is working to enhance its ongoing financial and resources management operations. These operations are critical to full accountability and disclosure and to effective stewardship of Federal resources. These operations include timely, complete formulation and execution of the budget, timely accurate accounting for JSC's activities, assets, liabilities, and equity and timely payment of its creditors, including payments to numerous vendors that provide goods and services to JSC.

In addition, JSC must continuously monitor Agency component compliance with established Federal and Agency financial and resources management policies and practices. One key element of JSC's Financial Management operations involves ongoing monitoring of key performance metrics. NASA reviewed JSC's ongoing operations through their quality assurance process.

Staff

JSC has a professional staff with capabilities commensurate with the challenging requirements of the current and future Federal financial and resources management environment. In that regard, JSC maintains an appropriate organizational structure for financial and resources management activities, maintains appropriate professional standards for critical positions, appropriately assesses and motivates exceptional performance, maintains effective intra-Agency communications, and appropriately trains and develops the entire JSC financial and resources management workforce.

Systems

In February 1995, NASA initiated the Integrated Financial Management Program (IFMP). Its goal is to establish an integrated financial management system, compliant with Federal Joint Financial Management Improvement Program (JFMIP) requirements.

JSC supports the move of its financial systems from an existing baseline structure to a targeted new structure. The existing baseline structure comprises a series of Agencywide and Center-unique automated systems, which support budget, financial, and procurement functions.

In order to achieve the targeted new structure, NASA has initiated activities that are resulting in standard Agency business processes and systems. The target integrated system will provide a financial management core, together with integrated budget, procurement, time and attendance, and travel modules to meet the needs of functional managers and end users, as well as decision makers at all levels.

Statements and Reporting

JSC provides reliable, useful, verifiable, timely financial resources and performance information and reports on its operations and activities. In that regard, JSC has achieved significant reporting improvements during the past few years and plans to continue to enhance such reporting in the future. During 1999, NASA received its fifth consecutive unqualified audit opinion on its 1998 Agencywide financial statements. NASA received the prestigious "Certificate in Excellence of Accountability Reporting" by the Association of Government Accountants (AGA) in recognition of the Agency's exemplary performance in the preparation, issuance, and timeliness of its Accountability Report. JSC participated in the annual audit by providing the appropriate financial management and reporting to NASA and assisted the auditors in their review of our financial systems. These statements were developed internally and, accordingly, are unaudited.

Streamlining

JSC has made significant progress in its movement toward a smaller, but more focused, civil service workforce. Approximately 700 full-time equivalent (FTE) reductions in the civil service workforce have been accomplished through voluntary measures such as separation incentives, hiring freezes, attrition, and aggressive outplacement.

Standards

During the next several years, JSC must effectively and efficiently implement a variety of new Federal and Agency standards and initiatives to support long-term financial and resources management excellence. These standards include recent Federal standards related to managerial cost accounting (full cost), as well as other key Federal and Agency initiatives.

NASA's Full Cost initiative introduces new cost accounting, budgeting, and management practices into NASA. The NASA full-cost concept and approach integrates full-cost accounting, budgeting, and management practices to enhance cost-effective mission performance by providing complete cost information for improved (more fully informed) decision making and management. The initiative

introduces a concept that ties all Agency costs (including civil service personnel costs) to major activities and budgets (programs and projects) for budgeting, accounting, and managing these programs and projects from a full-cost perspective.

While full cost implies financial matters, the approach to implementation includes broad and significant management implications. Full cost also supports full disclosure and reporting on programs and projects, with an improved matching of costs with related program and project performance. In that regard, full costing is consistent with sound business practices and with recent legislative and administrative guidance, including the CFO's Act of 1990, Government Performance and Results Act, the National Performance Review (NPR), and NASA's Zero Base Review. JSC will implement NASA's full-cost policies and guidelines, including the interim approach to NASA's full-cost practices for improvement in the cost effectiveness of mission performance. Under full cost, all Agency costs, including civil service labor and travel, direct, service, and general administrative costs, will be associated with major programs and projects. We will begin full-cost reporting of program and project direct cost, including civil service labor and travel, to Center project managers on a monthly basis during FY 2000.

Resource Management

Resource Management personnel began reporting to the Chief Financial Officer in December 1998. Previously, they reported to the Center's Business Management Director. Resource Management serves as the focal point for Center financial and workforce planning, including budget execution and implementation. Resource Management interfaces with the technical organization for budget planning, implementation, and execution. The Central Budget Office provides the following centralized functions to Center organizations: (a) provides overall policy, advice, procedures, and automated tools to accomplish Center resource planning and execution; (b) serves as the project office for JSC institutional management by providing advice and staff support to Center management; (c) coordinates, issues, reviews, and submits all Center program and institutional operating plans for financial and workforce data; (d) facilitates utilization of Center resources through distribution and control of resources authority; (e) provides resource reporting and variance analysis and performance analysis to Center management; (f) responds to special projects and actions.

Financial Management

The Financial Management Division (FMD) is responsible for providing internal controls to safeguard assets, promoting the accuracy and reliability of financial data, and encouraging adherence to approved NASA financial management policies. FMD established a system of checks and balances to detect and disclose any conditions and transactions not in conformance with legal, administrative, and accounting requirements, and to ensure that funds are disbursed only for the purposes for which they are legally available and administratively authorized.

In FY 1999, FMD submitted uncollectible delinquent accounts receivable to the Debt Management Service in compliance with the Debt Collection Improvement Act of 1996. FMD submitted for delinquent debt collection receivables totaling approximately $42,500, including interest, penalties, and administrative charges, in January 1999.

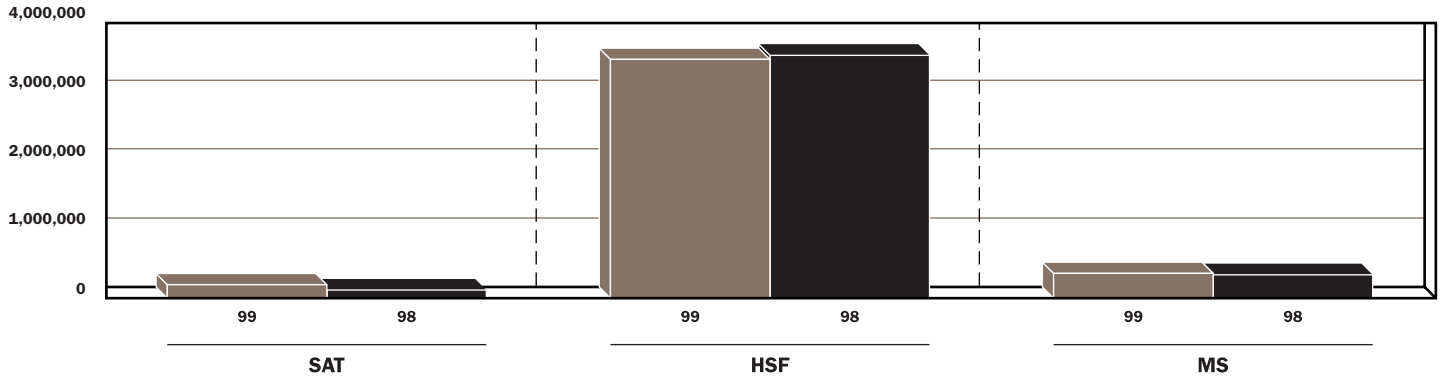
Accrued Expenditures (Dollars In Thousands)

	1999	1998	% Change
Accrued Expenditures, Appropriated, Gross	$ 4,276,490	$ 4,291,498	0%
Less: Funded Changes in Capitalized Assets & Inventory	239,060	282,490	(15%)
Accrued Expenditures, Appropriated, Net	$ 4,037,430	$ 4,009,008	1%

Program Expenses (Dollars In Thousands)

	1999	1998	Change
Science, Aeronautics, and Technology (SAT)	$ 196,467	$ 117,383	$ 79,084
Human Space Flight (HSF)	3,471,323	3,528,246	(56,923)
Mission Support (MS)	369,511	359,390	10,121
Research and Development (R&D)	(853)	28	(881)
Space Flight Control and Data Communications (SFCDC)	(1,583)	1,476	(3,059)
Construction of Facilities (C of F)	2,616	2,621	(5)
Research and Program Management (R&PM)	(51)	(136)	85
Total Program Expenses	$ 4,037,430	$ 4,009,008	$ 28,422

Current Appropriations



Program Expenses by Appropriation (Dollars In Thousands)

Science, Aeronautics, and Technology	1999	1998
Add: Cost of Current-Year Operations	$ 245,066	$ 120,939
Less: Change in Capitalized Expenses		
Fixed Assets in Progress	1,721	2,009
Contractor-Held Inventories	32,061	724
Contractor-Held Facilities in Progress	14,817	823
Contractor-Held Special Test Equipment	0	0
Contractor-Held Space Hardware	0	0
Contractor-Held Special Tooling	0	0
Total	48,599	3,556
Total Science, Aeronautics, and Technology	$ 196,467	$ 117,383

Human Space Flight	1999	1998
Add: Cost of Current-Year Operations	$ 3,585,334	$ 3,781,244
Less: Change in Capitalized Expenses		
Fixed Assets in Progress	8,241	8,923
Contractor-Held Inventories	(96,123)	157,265
Contractor-Held Facilities in Progress	(147,866)	320,899
Contractor-Held Special Test Equipment	(3,153)	34,608
Contractor-Held Space Hardware	352,927	(273,153)
Contractor-Held Special Tooling	(15)	4,456
Total	114,011	252,998
Total Human Space Flight	$ 3,471,323	$ 3,528,246

Program Expenses by Appropriation (Dollars In Thousands)

Mission Support		1999		1998
Add: Cost of Current-Year Operations	$	400,300	$	364,618
Less: Change in Capitalized Expenses				
Fixed Assets in Progress		10,261		5,403
Contractor-Held Facilities in Progress		6,484		0
Contractor-Held Inventories		13,748		(175)
Contractor-Held Special Test Equipment		0		0
Contractor-Held Space Hardware		296		0
Contractor-Held Special Tooling		0		0
Total		30,789		5,228
Total Mission Support	$	369,511	$	359,390

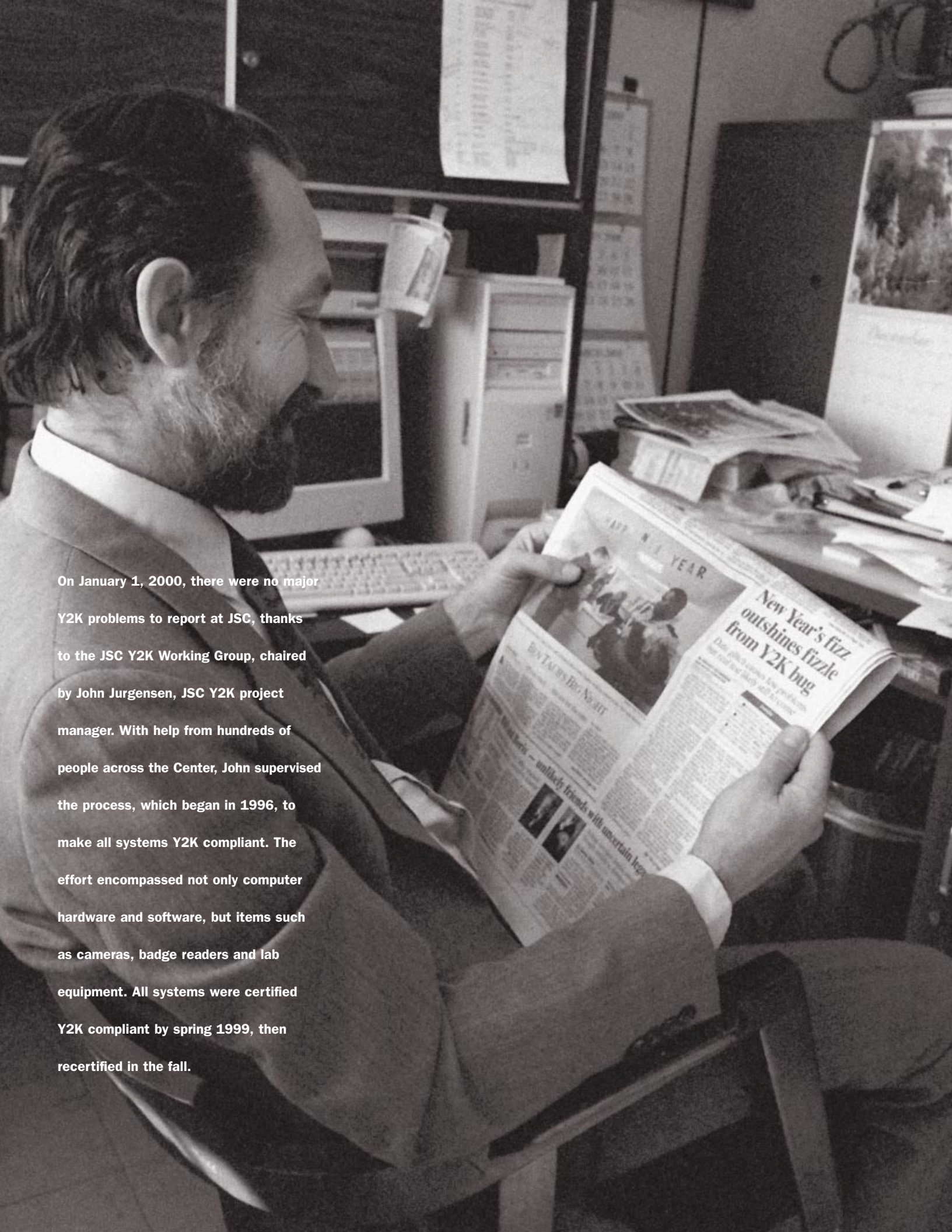
Research and Development		1999		1998
Add: Cost of Current-Year Operations	$	(853)	$	28
Less: Change in Capitalized Expenses				
Fixed Assets in Progress		0		0
Contractor-Held Facilities in Progress		0		0
Contractor-Held Inventories		0		0
Contractor-Held Special Test Equipment		0		0
Contractor-Held Space Hardware		0		0
Contractor-Held Special Tooling		0		0
Total		0		0
Total Research and Development	$	(853)	$	28

Program Expenses by Appropriation (Dollars In Thousands)

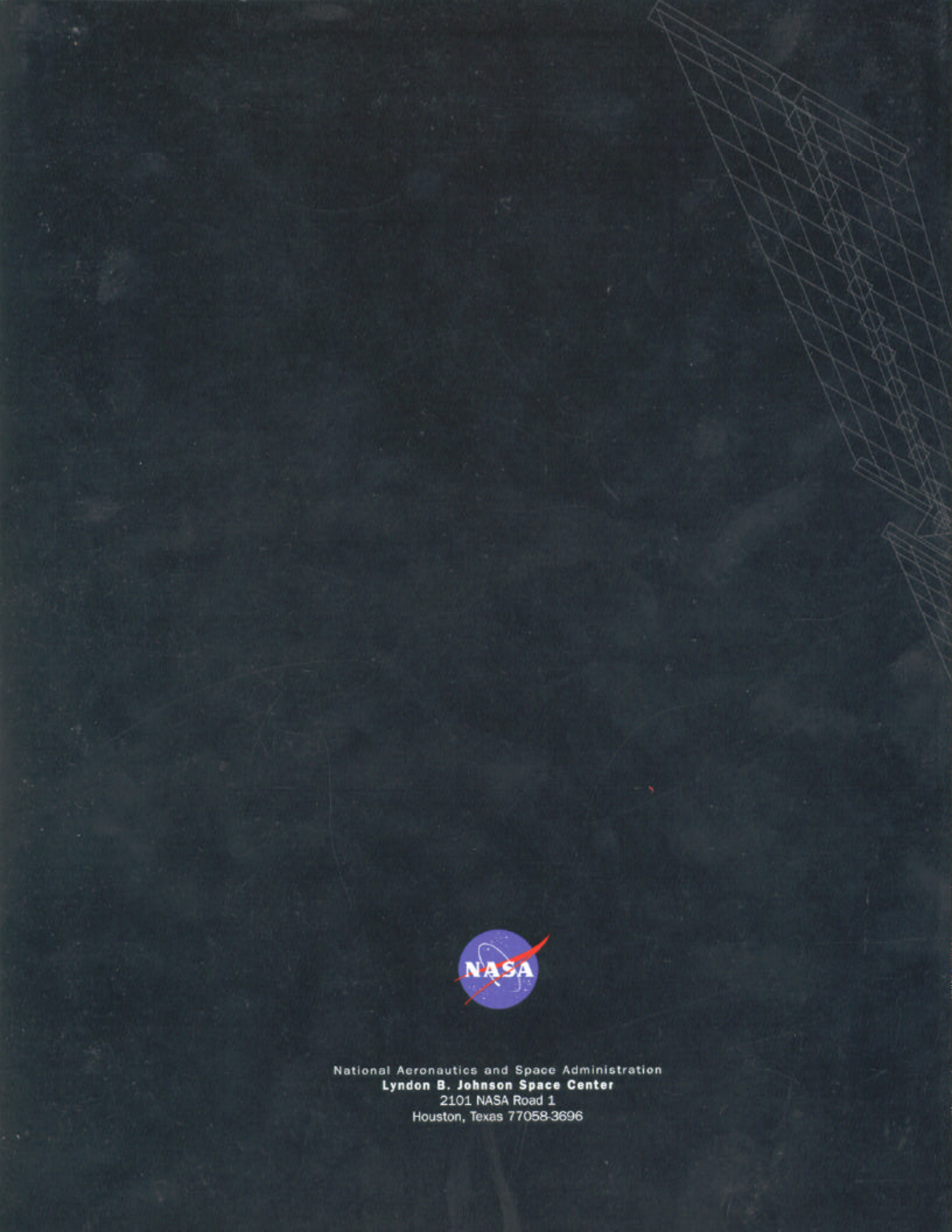
Space Flight Control and Data Communications		1999		1998
Add: Cost of Current-Year Operations	$	(1,583)	$	1,476
Less: Change in Capitalized Expenses				
Fixed Assets in Progress		0		0
Total		0		0
Total Space Flight Control and Data Communications	$	(1,583)	$	1,476

Construction of Facilities		1999		1998
Add: Cost of Current-Year Operations	$	2,926	$	4,051
Less: Change in Capitalized Expenses				
Fixed Assets in Progress		310		1,430
Total		310		1,430
Total Construction of Facilities	$	2,616	$	2,621

Research and Program Management		1999		1998
Add: Cost of Current-Year Operations	$	(51)	$	(136)
Less: Change in Capitalized Expenses				
Fixed Assets in Progress		0		0
Total		0		0
Total Research and Program Management	$	(51)	$	(136)



On January 1, 2000, there were no major Y2K problems to report at JSC, thanks to the JSC Y2K Working Group, chaired by John Jurgensen, JSC Y2K project manager. With help from hundreds of people across the Center, John supervised the process, which began in 1996, to make all systems Y2K compliant. The effort encompassed not only computer hardware and software, but items such as cameras, badge readers and lab equipment. All systems were certified Y2K compliant by spring 1999, then recertified in the fall.



National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
2101 NASA Road 1
Houston, Texas 77058-3696